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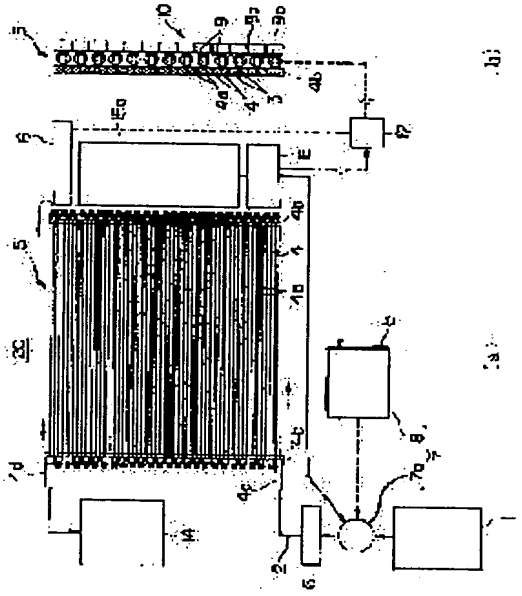
(54) WASTE WATER TREATING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a waste water treating apparatus in which quality of treated water can be highly kept and treating cost can be suppressed low.
SOLUTION: A waste water feeding means 2 for feeding org. substance-contg. waste water, a waste water treating part 5 provided with a photo-catalyst 3 in which the org. substances in the waste water fed from the waste water feeding means 2 are photo-oxidatively decomposed in the presence of light, a light intensity detecting means 6 for detecting intensity of natural light irradiated on the photo-catalyst 3, a waste water feeding amt. controlling means 7 for controlling amt. of feeding of the waste water to the waste water treating part 5 based on the intensity of natural light detected by the light intensity detecting means 6, an artificial light irradiating part 10 with an artificial light source 9 for irradiating an artificial light to the photo-catalyst 3 in the waste water treating part 5 and an artificial light controlling part 12 for controlling the intensity of the artificial light based on the intensity of the natural light detected by the light intensity detecting means 6, are provided.



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CLAIMS

[Claim(s)]
[Claim 1] The sewage disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from a sanitary-sewage supply means to supply the organic substance content sanitary sewage, and the sanitary-sewage supply means a photooxidized part under existence of light, The sewage treatment unit characterized by having an optical on-the-strength detection means to detect the reinforcement of the natural light irradiated by the photocatalyst, and a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply to the sewage disposal section based on the reinforcement of the natural light detected by the optical on-the-strength detection means.
[Claim 2] It is the sewage treatment unit characterized by enabling it for a sanitary-sewage amount-of-supply accommodation means to proportion the sanitary-sewage amount of supply about the reinforcement of said natural light mostly in a sewage treatment unit according to claim 1.
[Claim 3] It is the sewage treatment unit which makes the photoelectric cell which generates a sanitary-sewage amount-of-supply accommodation means in a sewage treatment unit according to claim 1 according to the reinforcement of the natural light the source of power, and is characterized by enabling it to proportion the sanitary-sewage amount of supply in the amount of generations of electrical energy of this photoelectric cell mostly.
[Claim 4] The sewage treatment unit characterized by having the artificial-light exposure section which has the artificial source which irradiates the artificial light at the photocatalyst of the sewage disposal section, and the artificial-light control section which adjusts the reinforcement of the artificial light based on the reinforcement of the natural light detected by the optical on-the-strength detection means in a sewage treatment unit given in any 1 term among claims 1-3.
[Claim 5] It is the sewage treatment unit characterized by an artificial-light control section being able to control lighting and putting out lights of an artificial source in a sewage treatment unit according to claim 4 based on said natural light reinforcement, and enabling it to make the reinforcement of the artificial light mostly in inverse proportion to the reinforcement of said natural light at the time of lighting of an artificial source.
[Claim 6] The sewage treatment unit characterized by to have the sewage-disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from a sanitary-sewage supply means supply the organic-substance content sanitary sewage, and a sanitary-sewage supply means a photooxidized part under existence of light, an organic-substance concentration detection means detect the organic-substance concentration of the sanitary sewage supplied to the sewage-disposal section, and a sanitary-sewage amount-of-supply accommodation means adjust the sanitary-sewage amount of supply to the sewage-disposal section based on the organic-substance concentration detected by the organic-substance concentration detection means.
[Claim 7] It is the sewage treatment unit characterized by the sanitary-sewage amount-of-supply accommodation means enabling it to make the sanitary-sewage amount of supply mostly in inverse proportion to the organic substance concentration in the sanitary sewage in a sewage treatment unit according to claim 6.
[Claim 8] The sewage treatment unit characterized by having the artificial-light exposure section which has the artificial source which irradiates the artificial light at the photocatalyst of the sewage disposal section in a sewage treatment unit according to claim 6 or 7, and the artificial-light control section which adjusts the reinforcement of the artificial light based on the organic substance concentration detected by the organic substance concentration detection means.
[Claim 9] It is the sewage treatment unit characterized by an artificial-light control section being able to control lighting and putting out lights of an artificial source in a sewage treatment unit according to claim 8 based on said organic substance concentration, and enabling it to proportion the reinforcement of the artificial light to said organic substance concentration mostly at the time of lighting of an artificial source.
[Claim 10] The sewage disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from a sanitary-sewage supply means to supply the organic substance content sanitary sewage, and the sanitary-sewage supply means a photooxidized part under existence of light, An optical on-the-strength detection means to detect the reinforcement of the natural light irradiated by the photocatalyst, and an organic substance concentration detection means to detect the organic substance concentration of the sanitary sewage supplied to the sewage disposal section, The sewage treatment unit characterized by having a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply to the

sewage disposal section based on the organic substance concentration in the sanitary sewage detected by the reinforcement of the natural light and/or the organic substance concentration detection means which were detected by the optical on-the-strength detection means.
[Claim 11] It is the sewage treatment unit characterized by enabling it for a sanitary-sewage amount-of-supply accommodation means to proportion the sanitary-sewage amount of supply to natural light reinforcement / organic substance concentration mostly in a sewage treatment unit according to claim 10.
[Claim 12] The sewage treatment unit characterized by having the artificial-light control section which adjusts the reinforcement of the artificial light based on the organic substance concentration in the sanitary sewage detected by the artificial-light exposure section which has the artificial source which irradiates the artificial light at the photocatalyst of the sewage disposal section in a sewage treatment unit according to claim 10 or 11, and the reinforcement of the natural light and/or the organic substance concentration detection means which were detected by the optical on-the-strength detection means.
[Claim 13] It is the sewage treatment unit characterized by an artificial-light control section being able to control lighting and putting out lights of an artificial source in a sewage treatment unit according to claim 13 based on said natural light reinforcement or said organic substance concentration, and enabling it to make the reinforcement of the artificial light mostly in inverse proportion to natural light reinforcement / organic substance concentration at the time of lighting of an artificial source.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the equipment which processes the organic substance in the sanitary sewage containing the organic substance.
[0002]
[Description of the Prior Art] Conventionally, the thing using the photocatalyst as equipment which processes the organic substance content sanitary sewage is known. This equipment irradiates light and urges photooxidation disassembly of the organic substance in the sanitary sewage to this photocatalyst while it contacts the organic substance content sanitary sewage to photocatalysts, such as a titanium dioxide. As a sewage treatment unit using a photocatalyst, the thing by which it was made for the natural light to be irradiated by the photocatalyst, and the thing constituted so that it might have artificial sources, such as an ultraviolet ray lamp, and the light from this light source could perform oxidative degradation of the organic substance are used.
[0003]
[Problem(s) to be Solved by the Invention] However, if it was in the above-mentioned conventional technique, there were the following problems. In the sewage treatment unit using the natural light as a light which irradiates the above-mentioned photocatalyst, since the reinforcement of the natural light was influenced by the weather etc., there was a problem from which a throughput does not become fixed but the quality of treated water becomes unstable. Moreover, in the sewage treatment unit using artificial sources, such as an ultraviolet ray lamp, although the throughput was stabilized, there was a problem on which the facility cost which an artificial source etc. takes, and power cost increase. This invention aims at offering the sewage treatment unit which was made in view of the above-mentioned situation, and can maintain the quality of treated water good, and can hold down processing cost low.
[0004]
[Means for Solving the Problem] A sanitary-sewage supply means by which the sewage treatment unit of this invention supplies the organic substance content sanitary sewage, The sewage disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from the sanitary-sewage supply means a photooxidized part under existence of light, It is characterized by having an optical on-the-strength detection means to detect the reinforcement of the natural light irradiated by the photocatalyst, and a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply to the sewage disposal section based on the reinforcement of the natural light detected by the optical on-the-strength detection means. Said sanitary-sewage amount-of-supply accommodation means can be constituted so that the sanitary-sewage amount of supply can be mostly proportioned about the reinforcement of said natural light. Moreover, a sanitary-sewage amount-of-supply accommodation means can make the photoelectric cell generated according to the reinforcement of the natural light the source of power, and it can constitute it so that the sanitary-sewage amount of supply can be mostly proportioned in the amount of generations of electrical energy of this photoelectric cell. Moreover, said sewage treatment unit shall have the artificial-light exposure section which has the artificial source which irradiates the artificial light in the photocatalyst of the sewage disposal section, and the artificial-light control section which adjusts the reinforcement of the artificial light based on the reinforcement of the natural light detected by the optical on-the-strength detection means. As for said artificial-light control section, it is desirable to constitute so that lighting and putting out lights of an artificial source can be controlled based on said natural light reinforcement and the reinforcement of the artificial light can be made mostly in inverse proportion to the reinforcement of said natural light at the time of lighting of an artificial source. Moreover, a sanitary-sewage supply means by which the sewage treatment unit of this invention supplies the organic substance content sanitary sewage, The sewage disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from the sanitary-sewage supply means a photooxidized part under existence of light, It shall have an organic substance concentration detection means to detect the organic substance concentration of the sanitary sewage supplied to the sewage disposal section, and a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply to the sewage disposal section based on the organic substance concentration detected by the organic substance concentration detection means. Said sanitary-sewage amount-of-supply accommodation means can constitute the sanitary-sewage amount of supply so that it can be made mostly in inverse proportion to the organic substance

concentration in the sanitary sewage. Moreover, said sewage treatment unit shall have the artificial-light exposure section which has the artificial source which irradiates the artificial light in the photocatalyst of the sewage disposal section, and the artificial-light control section which adjusts the reinforcement of the artificial light based on the organic substance concentration detected by the organic substance concentration detection means. As for said artificial-light control section, it is desirable to constitute so that lighting and putting out lights of an artificial source can be controlled based on said organic substance concentration and the reinforcement of the artificial light can be mostly proportioned to said organic substance concentration at the time of lighting of an artificial source. Moreover, a sanitary-sewage supply means by which the sewage treatment unit of this invention supplies the organic substance content sanitary sewage, The sewage disposal section equipped with the photocatalyst which understands the organic substance in the sanitary sewage supplied from the sanitary-sewage supply means a photooxidized part under existence of light, An optical on-the-strength detection means to detect the reinforcement of the natural light irradiated by the photocatalyst, and an organic substance concentration detection means to detect the organic substance concentration of the sanitary sewage supplied to the sewage disposal section, It shall have a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply to the sewage disposal section based on the organic substance concentration in the sanitary sewage detected by the reinforcement of the natural light and/or the organic substance concentration detection means which were detected by the optical on-the-strength detection means. Said sanitary-sewage amount-of-supply accommodation means can constitute the sanitary-sewage amount of supply so that it can be made to be proportional to natural light reinforcement / organic substance concentration mostly. Moreover, said sewage treatment unit shall have the artificial-light control section which adjusts the reinforcement of the artificial light based on the organic substance concentration in the sanitary sewage detected by the artificial-light exposure section which has the artificial source which irradiates the artificial light in the photocatalyst of the sewage disposal section, and the reinforcement of the natural light and/or the organic substance concentration detection means which were detected by the optical on-the-strength detection means. As for said artificial-light control section, it is desirable to constitute so that lighting and putting out lights of an artificial source can be controlled based on said natural light reinforcement or said organic substance concentration and the reinforcement of the artificial light can be made mostly in inverse proportion to natural light reinforcement / organic substance concentration at the time of lighting of an artificial source.

[0005]

[Embodiment of the Invention] The sewage treatment unit 20 which drawing 1 shows the 1st operation gestalt of the sewage treatment unit of this invention, and is shown here The depot 1 used as the source of supply of the organic substance content sanitary sewage, and the sanitary-sewage supply line 2 used as a sanitary-sewage supply means to supply the sanitary sewage in a depot 1, The sewage disposal section 5 which has the sanitary-sewage flow conduit way 4 filled up with the photocatalyst 3 which carries out photooxidation decomposition of the organic substance in the sanitary sewage supplied from the sanitary-sewage supply line 2, The sensor 6 on the strength [optical] used as an optical on-the-strength detection means to detect the reinforcement of the natural light irradiated by the photocatalyst 3, The sanitary-sewage amount-of-supply controller 7 used as a sanitary-sewage amount-of-supply accommodation means to adjust the sanitary-sewage amount of supply supplied to the sewage disposal section 5, The artificial-light exposure section 10 which has the ultraviolet-rays light source 9 which is an artificial source which irradiates ultraviolet-rays light in a photocatalyst 3, The artificial-light control section 12 which adjusts the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 based on the reinforcement of the natural light detected by the sensor 6 on the strength [optical], It should have photoelectric-cell 15a for charge connected to the treated water tank 14 by which the treated water which passed through the sewage disposal section 5 is introduced, the power source 15 connected to the sanitary-sewage amount-of-supply controller 7 and the artificial-light control section 12, and the power source 15.

[0006] Straight-line duct 4a of the shape of two or more straight pipe is put in order in parallel mutually, each edges are connected so that these straight-lines duct 4a may form one passage which has inlet-port section 4c and 4d of outlet sections as a whole, holder 4b is fixed mutually and the sanitary-sewage flow conduit way 4 of the sewage disposal section 5 is constituted. What consists of an ingredient which can penetrate the artificial light and the natural lights, such as ultraviolet-rays light, as an ingredient of straight-line duct 4a is used, and transparent materials, such as glass and synthetic resin, are usable. As straight-line duct 4a, what is the bore of 15-20mm and the outer diameter of 17-25mm, for example can be used.

[0007] As a photocatalyst 3 with which it filled up in the sanitary-sewage flow conduit way 4, it is activated by the exposure of light, for example, a near ultraviolet ray, and what can promote the photooxidation decomposition reaction of the organic substance in contact with this is used, for example, TiO2, CdS, SrTiO3, and Fe2O3 grade are usable. It is desirable to fabricate granular and to use [with a mean particle diameter of about 2-10mm] this photocatalyst 3.

[0008] As a sensor 6 on the strength [optical], a general-purpose ultraviolet sensor, an illuminance sensor, etc. can be used. The sensor 6 on the strength [optical] can be installed near the location 4 where the reinforcement of the natural light irradiated by this becomes almost equal to the reinforcement of the natural light irradiated by the photocatalyst 3 in the sanitary-sewage flow conduit way 4, for example, a sanitary-sewage flow conduit way, and the reinforcement (it may only be hereafter called natural light reinforcement) of the natural light irradiated by the photocatalyst 3 can be detected now. As for the sensor 6 on the strength [optical], it should be desirable to have enabled it to output the detecting signal of the electrical-potential-difference value according to natural light

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reinforcement or a current value, and the method which proportions mostly the electrical-potential-difference value or current value (detecting-signal value) of a detecting signal about natural light reinforcement should be adopted.

[0009] The sanitary-sewage amount-of-supply controller 7 shall have the sanitary-sewage control section 8 which should be based on the natural light reinforcement detected by the sensor 6 on the strength [optical] in the sanitary-sewage amount of supply by liquid-sending pump 7a which sends the sanitary sewage in a depot 1 to the sewage disposal section 5, and liquid-sending pump 7a. The sanitary-sewage amount-of-supply controller 7 can be constituted so that the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending pump 7a can be mostly proportioned about natural light reinforcement based on the detecting-signal value from the sensor 6 on the strength [optical].

[0010] The artificial-light exposure section 10 has the ultraviolet-rays light source 9 of the shape of two or more straight pipe arranged in parallel mutually, and rectangle tabular holder 9a which fixes these, and that whole enables it to irradiate this artificial-light exposure section 10 in ultraviolet-rays light from the lower part of the sanitary-sewage flow conduit way 4.

[0011] A general-purpose excimer lamp etc. can be used as the ultraviolet-rays light source 9. Reflecting plate 9b is prepared, when the ultraviolet-rays light source 9 lights up in the field by the side of the ultraviolet-rays light source 9 of holder 9a, the light irradiated towards reflecting plate 9b from the ultraviolet-rays light source 9 is reflected in it at high effectiveness, and the photocatalyst 3 in the sanitary-sewage flow conduit way 4 enables it to irradiate the reflected light.

[0012] The artificial-light control section 12 can control lighting and putting out lights of the ultraviolet-rays light source 9 based on natural light reinforcement, and can adjust ultraviolet-rays luminous intensity now based on natural light reinforcement at the time of lighting of the ultraviolet-rays light source 9. When the artificial-light control section 12 is less than the set point as which the detecting-signal value from the sensor 6 on the strength [optical] was determined beforehand, Namely, when the luminous intensity which the ultraviolet-rays light source 9 is made to turn on, and is irradiated by the photocatalyst 3 can be raised when natural light reinforcement is less than the set point defined beforehand, and a detecting-signal value turns into beyond the above-mentioned set point, That is, when it becomes beyond the set point as which natural light reinforcement was determined beforehand, the ultraviolet-rays light source 9 can be made to switch off. Moreover, as for the artificial-light control section 12, it is desirable to enable it to make mostly in inverse proportion to the reinforcement of the natural light the ultraviolet-rays luminous intensity irradiated by the photocatalyst 3 from the ultraviolet-rays light source 9 based on the detecting-signal value from the sensor 6 on the strength [optical] at the time of lighting of the ultraviolet-rays light source 9.

[0013] He connects with liquid-sending pump 7a, and is trying for a power source 15 to turn into a source of power of liquid-sending pump 7a. When the battery charged with the output of photoelectric-cell 15a for charge is used as a power source 15, since the above-mentioned natural light reinforcement can use the power charged by photoelectric-cell 15a under sufficient conditions and the power cost reduction of it becomes possible under a condition with the inadequate reinforcement of the natural light of not only the bottom of the condition from which sufficient natural lights, such as daytime at the time of fine weather, are acquired, for example but the time of a clouded sky, after sunset, etc., it is desirable. General-purpose semiconductor cells, such as an amorphous photoelectric cell generated by irradiating light as photoelectric-cell 15for charge a, a polycrystal photoelectric cell, and a crystall luminescence cell, etc. are usable.

[0014] In addition, electric supply also to the artificial-light control section 12 of a power source 15 is enabled. Moreover, as a power source 15, a general-purpose direct current or AC power supply can also be used. Moreover, the sign 16 in drawing shows the filter which filters the sanitary sewage in the sanitary-sewage supply line 2.

[0015] Next, an example of the operation of the sewage treatment unit 20 of this operation gestalt is explained. As sanitary sewage set as the object of processing by the sewage treatment unit 20 of this operation gestalt, the industrial wastewater containing the organic substance, a waterworks, sewage, domestic wasted water, etc. can be mentioned. In this example of use, based on the reinforcement of the natural light detected by the sensor 6 on the strength [optical], the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending pump 7a sets up beforehand the sanitary-sewage amount-of-supply controller 7 so that it may be proportional to the above-mentioned natural light reinforcement mostly. Moreover, the artificial-light control section 12 is set up so that the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 may be mostly in inverse proportion to the reinforcement of the natural light at the time of lighting of the ultraviolet-rays light source 9.

[0016] How to process the sanitary sewage under the condition from which the natural light of sufficient reinforcement, such as daytime at the time of fine weather, is hereafter acquired under the condition which is beyond the set point as which the reinforcement of the above-mentioned natural light was determined beforehand is explained. First, the processed sanitary sewage stored in the depot 1 is supplied from inlet-port section 4c through the sanitary-sewage supply line 2 in the sanitary-sewage flow conduit way 4 of the sewage disposal section 5 by the predetermined flow rate according to the reinforcement of the natural light detected by the sensor 6 on the strength [optical]. The processed sanitary sewage supplied in the sanitary-sewage flow conduit way 4 contacts the photocatalyst 3 in the sanitary-sewage flow conduit way 4 in the process in which the inside of the sanitary-sewage flow conduit way 4 is flowed.

[0017] Under the present circumstances, the natural light irradiated through the sanitary-sewage flow conduit way 4 which consists of an ingredient which can penetrate light, for example, a near ultraviolet ray, is activated, and a

photocatalyst 3 carries out oxidative degradation of the organic substance in the processed sanitary sewage in contact with a photocatalyst 3 by that catalysis. The processed sanitary sewage by which the organic substance was disassembled by contact to a photocatalyst 3 flows out of 4d of outlet sections of the sanitary-sewage flow conduit way 4 as treated water with which organic substance concentration decreased, and flows into the treated water tank 14.

[0018] Although the activity of a photocatalyst 3 falls and organic substance oxidative degradation processing effectiveness falls when the reinforcement of the natural light irradiated by the photocatalyst 3 falls Since he is trying for the sanitary-sewage amount of supply by liquid-sending pump 7a to be proportional to the above-mentioned natural light reinforcement mostly in this example of use as above-mentioned, according to the amount of falls of natural light reinforcement, the amount of liquid sending of liquid-sending pump 7a falls, and the amount of sanitary sewage supplied in the sanitary-sewage flow conduit way 4 per unit time amount is lessened. For example, when the reinforcement of the natural light irradiated by the sewage disposal section 5 becomes abbreviation half, the oxidative degradation processing effectiveness of the organic substance by the photocatalyst 3 and the flow rate of the sanitary sewage supplied to the sewage disposal section 5 although it falls to abbreviation one half serve as abbreviation half, and the total amount of the organic substance which flows into the sewage disposal section 5 per unit time amount serves as abbreviation half. Thus, since the amount of organic substance in the sanitary sewage supplied to the sewage disposal section 5 becomes a thing according to luminous intensity, the organic substance concentration in the treated water obtained is kept low.

[0019] On the contrary, when the reinforcement of the natural light irradiated by the photocatalyst 3 increases, according to the augend of natural light reinforcement, the amount of liquid sending of liquid-sending pump 7a increases by the sanitary-sewage control section 8. In this case, although the total amount of the organic substance in the sanitary sewage supplied to per unit time amount at the sewage disposal section 5 increases, since the oxidative degradation processing effectiveness of the organic substance improves according to increase of natural light reinforcement, the organic substance concentration of the treated water obtained is kept low. For example, when the reinforcement of the natural light irradiated by the sewage disposal section 5 doubles [about], the flow rate of the sanitary sewage supplied to the sewage disposal section 5 also becomes twice [about], but since the oxidative degradation processing effectiveness of the organic substance by the photocatalyst 3 also becomes twice [about], the organic substance concentration in treated water is kept low. Thus, when the reinforcement of the natural light increases, the amount of sewage disposal can be raised, without worsening quality of treated water.

[0020] Next, the reinforcement of the natural light decreases by weather change, sunset, etc., and actuation of the sewage treatment unit 20 when the luminous intensity detected by the sensor 6 on the strength [optical] is less than the set point defined beforehand is explained. When the reinforcement of the natural light is less than the above-mentioned set point, the artificial-light control section 12 makes the ultraviolet-rays light source 9 turn on based on the detecting signal outputted by the sensor 6 on the strength [optical]. The luminous intensity which ultraviolet-rays light is emitted from the ultraviolet-rays light source 9, and the emitted ultraviolet-rays light is irradiated by this by the photocatalyst 3 in the sanitary-sewage flow conduit way 4, and is irradiated by the photocatalyst 3 is maintained beyond the above-mentioned set point. For this reason, the sewage disposal effectiveness by the photocatalyst 3 is maintained highly, and the organic substance concentration in treated water is kept low.

[0021] In case the ultraviolet-rays light source 9 lights up, the ultraviolet-rays luminous intensity emitted by the artificial-light control section 12 from the ultraviolet-rays light source 9 comes to be in inverse proportion to the reinforcement of the natural light detected by the sensor 6 on the strength [optical]. By this, ultraviolet-rays luminous intensity irradiated from the ultraviolet-rays light source 9 is made into necessary minimum, the power cost which the ultraviolet-rays light source 9 takes is held down, and it becomes possible to plan processing cost reduction.

[0022] If it was in the sewage treatment unit 20 of this operation gestalt, since it should have the sanitary-sewage amount-of-supply controller 7 which adjusts the sanitary-sewage amount of supply based on the reinforcement of the natural light detected by the sensor 6 on the strength [optical] which detects the reinforcement of the natural light irradiated by the photocatalyst 3, and the sensor 6 on the strength [optical], the photooxidation decomposition throughput by the photocatalyst 3 should be embraced in the amount of the sanitary sewage supplied to the sewage disposal section 5. Therefore, processing effectiveness can be raised while always keeping low the organic substance concentration in treated water, even when the reinforcement of the natural light irradiated by the photocatalyst 3 is changed.

[0023] Moreover, according to the photooxidation decomposition throughput of a photocatalyst 3, the quality of treated water is [the amount of the sanitary sewage supplied to the sewage disposal section 5] correctly certainly maintainable by enabling it to proportion mostly the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending pump 7a about the above-mentioned natural light reinforcement good.

[0024] Moreover, only when the reinforcement of the natural light falls under to the above-mentioned set point by having had the artificial-light exposure section 10 which has the ultraviolet-rays light source 9, and the artificial-light control section 12 which adjusts ultraviolet-rays luminous intensity based on natural light reinforcement, the artificial-light exposure section 10 can be used, an ultraviolet-rays light exposure can be performed to a photocatalyst 3, and the luminous intensity given to a photocatalyst 3 can be maintained highly. For this reason, even when the luminous intensity given to a photocatalyst 3 runs short compared with the sewage treatment unit

only using the conventional natural light, this can be compensated immediately, the activity of a photocatalyst 3 can be maintained highly, and the organic substance concentration in treated water can be certainly kept low. Moreover, since the artificial light is used only when natural light reinforcement runs short, compared with the sewage treatment unit only using the conventional artificial light, the cost which an artificial-light exposure takes can be controlled low, and processing cost reduction can be planned.

[0025] Furthermore, according to the photooxidation decomposition throughput of a photocatalyst 3, much more processing cost control is correctly attained in the luminous intensity given to a photocatalyst 3 by enabling it to make ultraviolet-rays luminous intensity when the ultraviolet-rays light source 9 turns on the artificial-light control section 12 mostly in inverse proportion to natural light reinforcement.

[0026] Next, the 2nd operation gestalt of the sewage treatment unit of this invention is explained. The sewage treatment unit 30 which drawing 2 shows the 2nd operation gestalt of the sewage treatment unit of this invention, and is shown here is replaced with a power source 15 and photoelectric-cell 15a, are the point that the photoelectric cell 19 for sanitary-sewage amount-of-supply accommodation connected to liquid-sending pump 7a is formed, and the point that the sanitary-sewage control section 8 is not formed, and differs from the sewage treatment unit 20 of the operation gestalt of the above 1st.

[0027] General-purpose semiconductor cells, such as an amorphous photoelectric cell generated by irradiating light as a photoelectric cell 19 for sanitary-sewage amount-of-supply accommodation, a polycrystal photoelectric cell, and a crystall luminescence cell, etc. are usable. That to which the amount of generations of electrical energy is proportional to the natural light reinforcement irradiated by the photoelectric cell 19 mostly as a photoelectric cell 19 is used. A photoelectric cell 19 is installed near the location 4 where the reinforcement of the natural light irradiated by this becomes almost equal to the reinforcement of the natural light irradiated by the photocatalyst 3 in the sanitary-sewage flow conduit way 4, for example, a sanitary-sewage flow conduit way, and the amount of generations of electrical energy according to the luminous intensity irradiated by the photocatalyst 3 is obtained. A photoelectric cell 19 can be connected to liquid-sending pump 7a, and the sanitary-sewage amount of supply by liquid-sending pump 7a can be mostly proportioned now about the natural light reinforcement irradiated by the photoelectric cell 19.

[0028] When performing sewage disposal using the above-mentioned sewage treatment unit 30 and the reinforcement of the natural light irradiated by the photoelectric cell 19 is changed, according to this natural light reinforcement, the amount of generations of electrical energy of a photoelectric cell 19 fluctuates, and the amount of liquid sending of liquid-sending pump 7a fluctuates based on this. For example, when the reinforcement of the natural light irradiated by the photocatalyst 3 becomes twice [about], the amount of generations of electrical energy of a photoelectric cell 19 becomes twice [about], and the amount of liquid sending of liquid-sending pump 7a also increases twice [about]. On the contrary, when the reinforcement of the natural light irradiated by the photocatalyst 3 becomes abbreviation half, the amount of liquid sending of liquid-sending pump 7a also serves as abbreviation half.

[0029] Thus, processing effectiveness can be raised, while adjusting the sanitary-sewage amount of supply according to the reinforcement of this natural light and keeping low the organic substance concentration in treated water, even when the reinforcement of the natural light given to a photocatalyst 3 is changed like the sewage treatment unit 20 of the 1st above-mentioned operation gestalt, if it is in the sewage treatment unit 30 of this operation gestalt.

[0030] Moreover, if it is in the above-mentioned sewage treatment unit 30, by using the photoelectric cell 19 generated by the natural light as a source of power of liquid-sending pump 7a, in addition to the above-mentioned effectiveness, the power cost which the drive of liquid-sending pump 7a takes can be reduced, and the effectiveness that processing cost reduction can be planned can be acquired. Moreover, the sanitary-sewage control section 8 is made unnecessary, and the effectiveness that facility cost reduction becomes possible is also acquired.

[0031] Next, the 3rd operation gestalt of the sewage treatment unit of this invention is explained. The sewage treatment unit 40 which drawing 3 shows the 3rd operation gestalt of the sewage treatment unit of this invention, and is shown here The point that the sensor 6 on the strength [optical] is not formed, but the organic substance concentration sensor 13 which detects the organic substance concentration of the sanitary sewage in a depot 1 is formed, Replace with the artificial-light control section 12, and it is based on the organic substance concentration in the sanitary sewage detected by the organic substance concentration sensor 13. The point that the artificial-light control section 22 which adjusts the ultraviolet-rays luminous intensity irradiated from the ultraviolet-rays light source 9 is formed, and the sanitary-sewage amount-of-supply controller shown with a sign 17 Liquid-sending pump 7a, It differs from the sewage treatment unit 20 of the operation gestalt of the above 1st at the point which shall consist of a sanitary-sewage control section 18 which should be based on the organic substance concentration in the sanitary sewage detected by the organic substance concentration sensor 13 in the sanitary-sewage amount of supply by liquid-sending pump 7a.

[0032] As an organic substance concentration sensor 13, a general-purpose COD sensor, TC sensor, etc. can be used. The organic substance concentration sensor 13 can be installed in a depot 1, and can detect now the organic substance concentration (it may only be hereafter called organic substance concentration) of the sanitary sewage in a depot 1. As for the organic substance concentration sensor 13, it should be desirable to have enabled it to output the detecting signal of the electrical-potential-difference value according to the concentration of the organic substance or a current value, and the method which proportions mostly the electrical-potential-difference

value or current value (detecting-signal value) of a detecting signal to organic substance concentration should be adopted. The sanitary-sewage amount-of-supply controller 17 can make it possible to make the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending pump 7a mostly in inverse proportion to the above-mentioned organic substance concentration based on the detecting-signal value from the organic substance concentration sensor 13.

[0033] The artificial-light control section 22 can control lighting and putting out lights of the ultraviolet-rays light source 9 based on the above-mentioned organic substance concentration, and can adjust ultraviolet-rays luminous intensity now based on organic substance concentration at the time of lighting of the ultraviolet-rays light source 9. When the artificial-light control section 22 becomes beyond the set point as which the detecting-signal value from the organic substance concentration sensor 13 was determined beforehand, Namely, when less than the set point as which the luminous intensity which the ultraviolet-rays light source 9 is made to turn on, and is irradiated by the photocatalyst 3 could be raised when it became beyond the set point as which organic substance concentration was determined beforehand, and the detecting-signal value was determined beforehand, That is, when organic substance concentration is less than the set point defined beforehand, the ultraviolet-rays light source 9 can be made to switch off. As for the artificial-light control section 22, it is desirable to enable it to proportion mostly the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 to the organic substance concentration in the sanitary sewage based on a detecting-signal value at the time of lighting of the ultraviolet-rays light source 9.

[0034] Next, an example of the operation of the sewage treatment unit 40 of this operation gestalt is explained. In this example of use, based on the organic substance concentration in the sanitary sewage detected by the organic substance concentration sensor 13, the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending pump 7a sets up beforehand the sanitary-sewage amount-of-supply controller 17 so that it may be mostly in inverse proportion to the above-mentioned organic substance concentration. Moreover, the artificial-light control section 22 is set up so that the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 may be proportional to organic substance concentration mostly at the time of lighting of the ultraviolet-rays light source 9.

[0035] In this example of use, since he is trying for the sanitary-sewage amount of supply to be mostly in inverse proportion to the organic substance concentration of the sanitary sewage, when the organic substance concentration in the sanitary sewage increases, the amount of sanitary sewage per [which is supplied to the sewage disposal section 5 according to the augend of organic substance concentration] time amount is lessened. For example, when the organic substance concentration of the sanitary sewage becomes twice [about], the amount of sanitary sewage supplied to the sewage disposal section 5 serves as abbreviation half. On the contrary, when the organic substance concentration in the sanitary sewage decreases, the amount of sanitary sewage per [which is supplied to the sewage disposal section 5 according to the decrement of organic substance concentration] time amount increases. For example, when the organic substance concentration of the sanitary sewage becomes abbreviation half, the amount of sanitary sewage supplied to the sewage disposal section 5 becomes twice [about]. Therefore, the total amount of the organic substance supplied to per unit time amount at the sewage disposal section 5 is maintained almost uniformly, and the organic substance concentration in the treated water obtained is kept low.

[0036] When organic substance concentration increases beyond the above-mentioned set point, the ultraviolet-rays light source 9 is switched on by the artificial-light control section 22, and the luminous intensity irradiated by the photocatalyst 3 by this increases. When the organic substance concentration in the sanitary sewage which should be processed is generally high in organic substance content sewage disposal, there is an inclination for the oxidation-treatment effectiveness of the organic substance in the sanitary sewage to fall, but in this example of use, if the organic substance becomes beyond the above-mentioned set point, the photooxidation decomposition activity of a photocatalyst 3 increases by the ultraviolet-rays light exposure by the ultraviolet-rays light source 9, oxidative degradation processing of the organic substance comes to be ensured, and treated-water deterioration can be prevented.

[0037] In case the ultraviolet-rays light source 9 lights up, the ultraviolet-rays luminous intensity emitted from the ultraviolet-rays light source 9 comes to be proportional to the organic substance concentration detected by the organic substance concentration sensor 13 mostly. By this, ultraviolet-rays luminous intensity irradiated from the ultraviolet-rays light source 9 is made into necessary minimum, the power cost which the ultraviolet-rays light source 9 takes is held down, and it becomes possible to plan processing cost reduction.

[0038] If it was in the sewage treatment unit 40 of this operation gestalt, since it should have the sanitary-sewage amount-of-supply controller 17 which should be based on the organic substance concentration in the sanitary sewage in the organic substance concentration sensor 13 which detects the organic substance concentration in the sanitary sewage supplied to the sewage disposal section 5, and the sanitary-sewage amount of supply by liquid-sending pump 7a, the throughput of equipment should be embraced in the total amount of the organic substance in the sanitary sewage supplied to per unit time amount at the sewage disposal section 5. Therefore, processing effectiveness can be raised while always keeping low the organic substance concentration in treated water, even when the organic substance concentration in the sanitary sewage supplied to the sewage disposal section 5 is changed.

[0039] Moreover, according to the photooxidation decomposition throughput of a photocatalyst 3, the quality of treated water is [the total amount of the organic substance supplied to per unit time amount in the sanitary-

sewage amount-of-supply controller 17 at the sewage disposal section 5 by enabling it to make the sanitary-sewage amount of supply mostly in inverse proportion to organic substance concentration] correctly certainly maintainable good.

[0040] Moreover, even when the organic substance concentration in the sanitary sewage is high, while raising the photooxidation decomposition activity of a photocatalyst 3 and preventing treated water deterioration by forming the artificial-light exposure section 10 and the artificial-light control section 22 which adjusts the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 based on the organic substance concentration in the sanitary sewage, it becomes possible to hold down protection processing cost about the luminous intensity irradiated by the photocatalyst 3 becoming superfluous.

[0041] Moreover, by the artificial-light control section 22 enabling it to proportion ultraviolet-rays luminous intensity to the organic substance concentration in the sanitary sewage mostly at the time of lighting of the ultraviolet-rays light source 9, light can be irradiated the neither more nor less at a photocatalyst 3, and much more improvement in the nature of treated water and processing cost control are attained.

[0042] Next, the 4th operation gestalt of the sewage treatment unit of this invention is explained. The sewage treatment unit 50 which drawing 4 shows the 4th operation gestalt of the sewage treatment unit of this invention, and is shown here It replaces with the point that the same sensor 6 on the strength [optical] as the sewage treatment unit 20 of the 1st operation gestalt is formed, and the sanitary-sewage amount-of-supply controller 17. Liquid-sending pump 7a, The point that the sanitary-sewage amount-of-supply controller 27 which consists the sanitary-sewage amount of supply by liquid-sending pump 7a of a sanitary-sewage control section 28 based on natural light reinforcement and/or organic substance concentration is formed, And it replaces with the artificial-light control section 22, and differs from the sewage treatment unit 40 of the operation gestalt of the above 3rd in that the artificial-light control section 32 which had the reinforcement of the artificial light adjusted based on natural light reinforcement and/or organic substance concentration is formed.

[0043] The sanitary-sewage amount-of-supply controller 27 is made possible [that the sanitary-sewage amount of supply by liquid-sending pump 7a should be based on either or both among the reinforcement of the natural light detected by the sensor 6 on the strength / optical /, and the organic substance concentration of the sanitary sewage detected by the organic substance concentration sensor 13]. When the sanitary-sewage amount of supply shall be based only on natural light reinforcement, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that the sanitary-sewage amount of supply may be proportional to natural light reinforcement mostly. Moreover, when the sanitary-sewage amount of supply shall be based only on organic substance concentration, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that the sanitary-sewage amount of supply may be mostly in inverse proportion to organic substance concentration. Moreover, when the sanitary-sewage amount of supply shall be based on both natural light reinforcement and organic substance concentration, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that the sanitary-sewage amount of supply may be proportional to natural light reinforcement / organic substance concentration (value which **(ed) natural light reinforcement by the organic substance concentration in the sanitary sewage) mostly.

[0044] The artificial-light control section 32 can control lighting and putting out lights of the ultraviolet-rays light source 9 based on either or both among the natural light reinforcement detected by the sensor 6 on the strength [optical], and the organic substance concentration detected by the organic substance concentration sensor 13, and can adjust ultraviolet-rays luminous intensity now based on either or both among natural light reinforcement and organic substance concentration at the time of lighting of the ultraviolet-rays light source 9.

[0045] The artificial-light control section 32 can make the ultraviolet-rays light source 9 turn on, when it becomes beyond the set point as which organic substance concentration was beforehand determined when natural light reinforcement was less than the set point defined beforehand, or when natural light reinforcement / organic substance concentration is less than the set point defined beforehand. Moreover, the artificial-light control section 32 can make the ultraviolet-rays light source 9 switch off, when less than the set point as which organic substance concentration was beforehand determined when it became beyond the set point as which natural light reinforcement was determined beforehand, or when it becomes beyond the set point as which natural light reinforcement / organic substance concentration was determined beforehand.

[0046] Moreover, the artificial-light control section 32 can be set up now as the ultraviolet-rays light reinforcement from the ultraviolet-rays light source 9 is shown below based on either or both among natural light reinforcement and organic substance concentration at the time of lighting of the ultraviolet-rays light source 9. When ultraviolet-rays light reinforcement shall be based only on natural light reinforcement, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that ultraviolet-rays light reinforcement may be mostly in inverse proportion to natural light reinforcement. Moreover, when ultraviolet-rays light reinforcement shall be based only on organic substance concentration, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that ultraviolet-rays reinforcement may be proportional to organic substance concentration mostly. Moreover, when ultraviolet-rays light reinforcement shall be based on both natural light reinforcement and organic substance concentration, it is desirable to enable it to set up the sanitary-sewage amount-of-supply controller 27 so that ultraviolet-rays light reinforcement may be mostly in inverse proportion to natural light reinforcement / organic substance concentration.

[0047] Next, an example of the operation of the sewage treatment unit 50 of this operation gestalt is explained. In this example of use, the sanitary-sewage amount of supply to the sewage disposal section 5 by liquid-sending

pump 7a sets up beforehand the sanitary-sewage amount-of-supply controller 27 so that it may be proportional to the above-mentioned natural light reinforcement / organic substance concentration mostly. Moreover, the sanitary-sewage amount-of-supply controller 27 is beforehand set up so that ultraviolet-rays light reinforcement may be mostly in inverse proportion to natural light reinforcement / organic substance concentration at the time of lighting of the ultraviolet-rays light source 9.

[0048] Actuation of the sewage treatment unit 50 in the case of changing hereafter the reinforcement of the natural light detected by the organic substance concentration and/or the sensor 6 on the strength [optical] in the sanitary sewage within limits from which lighting of the ultraviolet-rays light source 9 becomes unnecessary is explained.

[0049] First, the case where the organic substance concentration in the sanitary sewage takes constant value, and natural light reinforcement is changed is explained. In this example of use, since he is trying for the sanitary-sewage amount of supply to be proportional to the above-mentioned natural light reinforcement / organic substance concentration mostly, the sanitary-sewage amount of supply is lessened in proportion [almost] to the amount of falls of natural light reinforcement. For example, when the reinforcement of the natural light becomes abbreviation half, the sanitary-sewage amount of supply also serves as abbreviation half, and the total amount of the organic substance which flows into the sewage disposal section 5 per unit time amount serves as abbreviation half. Thus, since the total amount of the organic substance supplied to per unit time amount at the sewage disposal section 5 becomes a thing according to luminous intensity, the organic substance concentration in the treated water obtained is kept low.

[0050] On the contrary, when the reinforcement of the natural light irradiated by the photocatalyst 3 increases, the sanitary-sewage amount of supply increases in proportion to the augend of natural light reinforcement. In this case, since the oxidative degradation processing effectiveness of the organic substance improves, the organic substance concentration of the treated water obtained is kept low. For example, when the reinforcement of the natural light doubles [about], the sanitary-sewage amount of supply also becomes twice [about], but since the oxidative degradation processing effectiveness of the organic substance by the photocatalyst 3 also becomes twice [about], the organic substance concentration in treated water is kept low. Thus, when the reinforcement of the natural light increases, the amount of sewage disposal can be raised, without worsening quality of treated water.

[0051] Next, the case where natural light reinforcement takes constant value, and the organic substance concentration in the sanitary sewage is changed is explained. When the organic substance concentration in the sanitary sewage increases, the amount of sanitary sewage per [which is supplied to the sewage disposal section 5 in inverse proportion to the augend of organic substance concentration] time amount is lessened. For example, when the organic substance concentration of the sanitary sewage becomes twice [about], the amount of sanitary sewage supplied to the sewage disposal section 5 serves as abbreviation half. On the contrary, when the organic substance concentration in the sanitary sewage decreases, the amount of sanitary sewage per [which is supplied to the sewage disposal section 5 in inverse proportion to the decrement of organic substance concentration] time amount increases. For example, when the organic substance concentration of the sanitary sewage becomes abbreviation half, the amount of sanitary sewage supplied to the sewage disposal section 5 becomes twice [about]. Therefore, the amount of organic substance supplied to per unit time amount at the sewage disposal section 5 is maintained almost uniformly, and the organic substance concentration in the treated water obtained is kept low.

[0052] Next, the case where natural light reinforcement and the organic substance concentration of the sanitary sewage are changed to coincidence is explained. In this example of use, when the organic substance concentration in the sanitary sewage becomes abbreviation half while natural light reinforcement becomes twice [about] since the sanitary-sewage amount of supply is proportional to natural light reinforcement / organic substance concentration mostly for example, the sanitary-sewage amount of supply becomes twice [about], i.e., about 4 times, further based on twice [about] and organic substance concentration based on natural light reinforcement. Moreover, when the organic substance concentration in the sanitary sewage becomes twice [about] while natural light reinforcement serves as abbreviation half, the sanitary-sewage amount of supply becomes abbreviation half, i.e., about 1/4 time, further based on abbreviation one half and organic substance concentration based on natural light reinforcement. moreover, the case where both natural light reinforcement and organic substance concentration become twice [about] — the amount of sanitary-sewage liquid sending — natural light reinforcement — being based — twice [about] and organic substance concentration — being based — abbreviation one half — that is, changing becomes almost nothing.

[0053] Moreover, when the reinforcement of the natural light decreases by weather change, sunset, etc., or the organic substance concentration in the sanitary sewage increases and natural light reinforcement / organic substance concentration is less than the set point defined beforehand, the ultraviolet-rays light source 9 lights up by the artificial-light control section 32, ultraviolet-rays light is emitted from the ultraviolet-rays light source 9, and the luminous intensity irradiated by the photocatalyst 3 increases.

[0054] In case the ultraviolet-rays light source 9 lights up, the ultraviolet-rays luminous intensity emitted from the ultraviolet-rays light source 9 comes to be proportional to natural light reinforcement / organic substance concentration mostly. By this, ultraviolet-rays luminous intensity irradiated from the ultraviolet-rays light source 9 is made into necessary minimum, the power cost which the ultraviolet-rays light source 9 takes is held down, and it becomes possible to plan processing cost reduction.

[0055] If it is in the sewage treatment unit 50 of this operation gestalt, since it has the sensor 6 on the strength [optical], the organic substance concentration sensor 13, and the sanitary-sewage amount-of-supply controller 27 that should be based on natural light reinforcement and/or organic substance concentration in the sanitary-sewage amount of supply, the total amount of the organic substance in the sanitary sewage supplied to per unit time amount at the sewage disposal section 5 should be correctly responded to the photooxidation decomposition activity of a photocatalyst 3. Therefore, processing effectiveness can be raised while always keeping low the organic substance concentration in treated water, even when which of the organic substance concentration in the sanitary sewage supplied to the sewage disposal section 5 and the natural light reinforcement irradiated by the photocatalyst 3 is changed.
[0056] Moreover, according to the photooxidation decomposition throughput of a photocatalyst 3, improvement in the nature of treated water and processing cost control can be aimed at for the total amount of the organic substance supplied to the sewage disposal section 5 in the sanitary-sewage amount-of-supply controller 27 by enabling it to proportion the sanitary-sewage amount of supply to natural light reinforcement / organic substance concentration mostly much more correctly.
[0057] Moreover, even when natural light reinforcement and/or organic substance concentration are changed by forming the artificial-light exposure section 10 and the artificial-light control section 32 which adjusts the ultraviolet-rays luminous intensity from the ultraviolet-rays light source 9 based on natural light reinforcement and/or organic substance concentration, while raising the photooxidation decomposition activity of a photocatalyst 3 and preventing treated water deterioration, it becomes possible to hold down protection processing cost about the luminous intensity irradiated by the photocatalyst 3 becoming superfluous.
[0058] Moreover, by the artificial-light control section 32 enabling it to proportion ultraviolet-rays luminous intensity to natural light reinforcement / organic substance concentration mostly at the time of lighting of the ultraviolet-rays light source 9, light can be irradiated the neither more nor less at a photocatalyst 3, and much more improvement in the nature of treated water and processing cost control are attained.
[0059] Moreover, drawing 5 shows the sewage disposal section and the artificial-light exposure section which are used for the 5th operation gestalt of the sewage treatment unit of this invention, and the sewage treatment unit 60 of this 5th operation gestalt is the point that the reflecting plate 26 is formed between the sanitary-sewage flow conduit way 4 and the ultraviolet-rays light source 9, and differs from the sewage treatment units 20, 30, 40, and 50 of the above-mentioned 1st thru/or the 4th operation gestalt. A reflecting plate 26 is for raising the exposure effectiveness to the photocatalyst 3 of the natural light, and is formed in rectangle the whole sanitary-sewage flow conduit way 4 tabular to. A reflecting plate 26 can be formed so that a top-face 4, i.e., sanitary-sewage flow conduit way, side may serve as a high reflection factor, it can reflect the natural light which reached down the sanitary-sewage flow conduit way 4, and can irradiate the reflected light now at the photocatalyst 3 in the sanitary-sewage flow conduit way 4.
[0060] A reflecting plate 26 is made movable at field inboard, and can be moved now to the location which does not interrupt the exposure of the ultraviolet-rays light turned to the sanitary-sewage flow conduit way 4 shown in drawing 5 , and the sanitary-sewage flow conduit way 4 from the ultraviolet-rays light source 9 from the location between the ultraviolet-rays light sources 9.
[0061] In case the sewage treatment unit equipped with the above-mentioned reflecting plate 26 is used, in using only the natural light, as shown in drawing 5 , it arranges a reflecting plate 26 between the sanitary-sewage flow conduit way 4 and the ultraviolet-rays light source 9. The natural light which passed through the sanitary-sewage flow conduit way 4, and reached down the sanitary-sewage flow conduit way 4 by this is reflected on a reflecting plate 26, and the part is irradiated toward the upper part by the photocatalyst 3 in the sanitary-sewage flow conduit way 4. For this reason, the reinforcement of the natural light irradiated by the photocatalyst 3 is raised. Moreover, when using the ultraviolet-rays light source 9, it is made to move to the location which does not interrupt the exposure of the ultraviolet-rays light which turned the reflecting plate 26 to the sanitary-sewage flow conduit way 4 from the ultraviolet-rays light source 9.
[0062] In the sewage treatment unit 60 of this operation gestalt, when using only the natural light by use of a reflecting plate 26, the reinforcement of the natural light irradiated by the photocatalyst 3 can be raised, and the effectiveness of sewage disposal can be raised.
[0063] In addition, although it should have the ultraviolet-rays light source 9 which irradiates ultraviolet rays in the artificial-light exposure section 10 in the sewage treatment unit of each above-mentioned operation gestalt, it should have the light source which can irradiate not only this but the light, infrared light, etc. Moreover, in each above-mentioned sewage treatment unit, although the artificial-light exposure section 10 was formed down the sanitary-sewage flow conduit way 4, the installation location of not only this but the artificial-light exposure section 10 can be made arbitrary, for example, can also be established in the exterior of the sewage disposal section 5. Moreover, when the artificial-light exposure section 10 and the artificial-light control sections 12, 22, and 32 are formed and natural light reinforcement, organic substance concentration, or natural light reinforcement / organic substance concentration is less than the set point in each above-mentioned sewage treatment unit, Or although it enabled it to irradiate the artificial light at a photocatalyst 3 when it became beyond the set point, it is also possible to constitute a sewage treatment unit from a sewage treatment unit of this invention, without preparing not only this but the artificial-light exposure section 10 and the artificial-light control sections 12, 22, and 32.
[0064]

[Effect of the Invention] Processing effectiveness can be raised while always keeping low the organic substance concentration in treated water, even when the reinforcement of the natural light irradiated by the photocatalyst and/or the organic substance concentration in the sanitary sewage are changed if it is in the sewage treatment unit of this invention as explained above. Moreover, the artificial light is irradiated at a photocatalyst only at the time of a natural light fall on the strength or the increment in organic substance concentration by having equipped the photocatalyst with the artificial-light exposure section which irradiates the artificial light, and the artificial-light control section which adjusts the reinforcement of the artificial light, while maintaining the activity of a photocatalyst highly and preventing aggravation of the quality of treated water by this, the cost which an artificial-light exposure takes can be controlled low, and processing cost reduction can be planned.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] (a) It is the top view showing the outline configuration of the 1st operation gestalt of the sewage treatment unit of this invention. It is the side elevation of the sewage disposal section of the sewage treatment unit shown in (b) and (a), and the artificial-light exposure section.
[Drawing 2] (a) It is the top view showing the outline configuration of the 2nd operation gestalt of the sewage treatment unit of this invention. It is the side elevation of the sewage disposal section of the sewage treatment unit shown in (b) and (a), and the artificial-light exposure section.
[Drawing 3] (a) It is the top view showing the outline configuration of the 3rd operation gestalt of the sewage treatment unit of this invention. It is the side elevation of the sewage disposal section of the sewage treatment unit shown in (b) and (a), and the artificial-light exposure section.
[Drawing 4] (a) It is the top view showing the outline configuration of the 4th operation gestalt of the sewage treatment unit of this invention. It is the side elevation of the sewage disposal section of the sewage treatment unit shown in (b) and (a), and the artificial-light exposure section.
[Drawing 5] (a) It is the side elevation showing the sewage disposal section and the artificial-light exposure section which are used for the 5th operation gestalt of the sewage treatment unit of this invention. It is the important section enlarged drawing of the sewage treatment unit shown in (b) and (a).
[Description of Notations]
2 ... A sanitary-sewage supply line (sanitary-sewage supply means), 3 ... A photocatalyst, 5 ... Sewage disposal section, 6 ... A sensor (optical on-the-strength detection means) on the strength [optical], 7, 17, 27 ... Sanitary-sewage amount-of-supply controller (sanitary-sewage amount-of-supply accommodation means), 8, 18, 28 ... A sanitary-sewage control section, 9 ... Ultraviolet-rays light source (artificial source), 10 [... The photoelectric cell for sanitary-sewage amount-of-supply accommodation 20, 30, 40, 50, 60 / ... Sewage treatment unit] ... The artificial-light exposure section, 12, 22, 32 ... An artificial-light control section, 13 ... An organic substance concentration sensor (organic substance concentration detection means), 19

[Translation done.]

* NOTICES *

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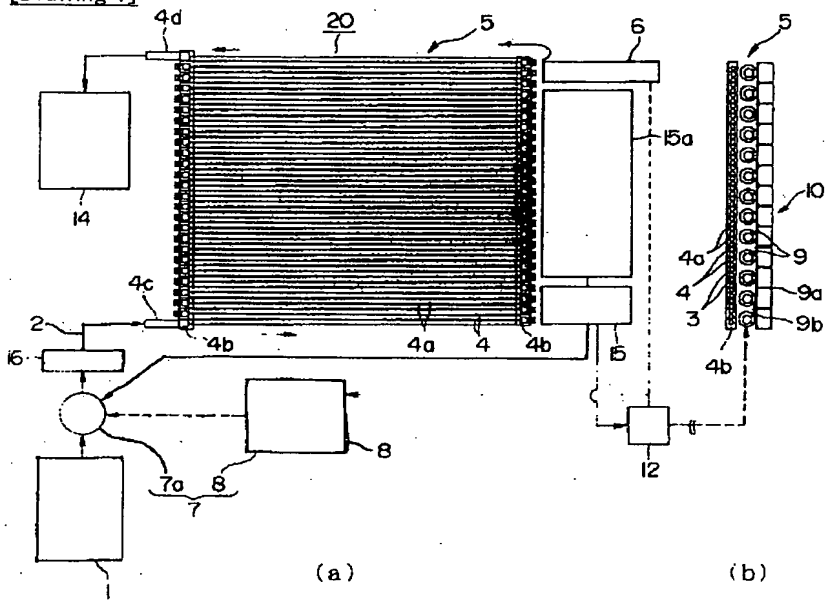
damages caused by the use of this translation.

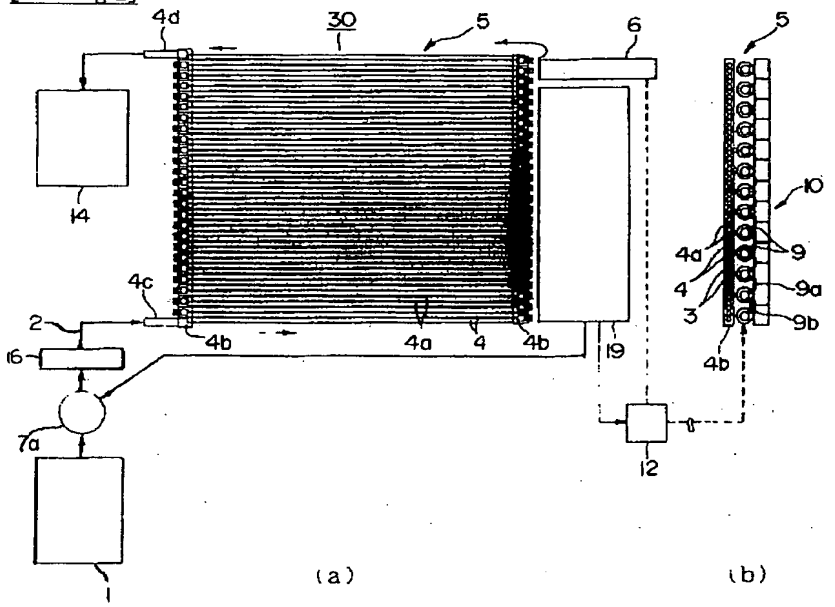
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

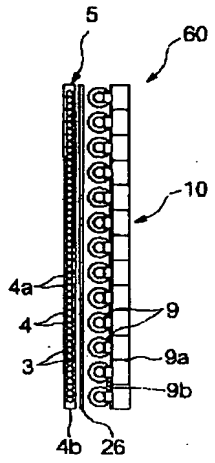


[Drawing 2]

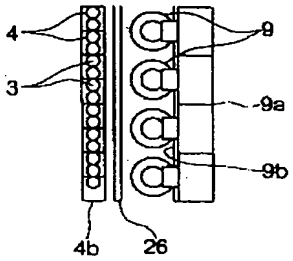


[Drawing 5]

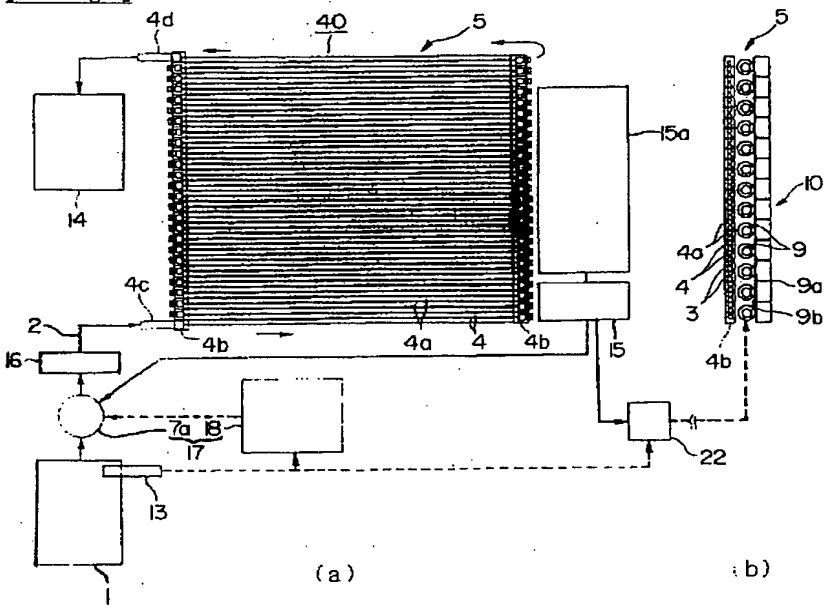
(a)



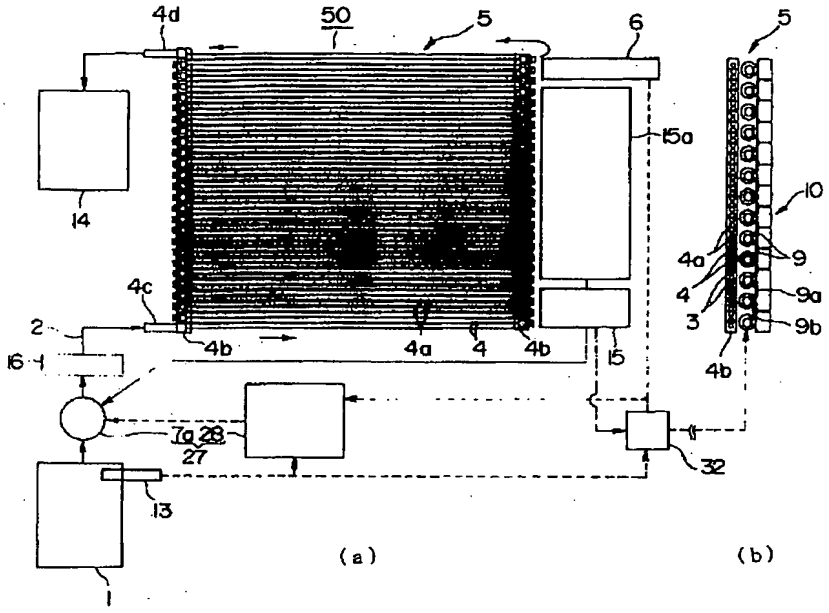
(b)



[Drawing 3]



[Drawing 4]



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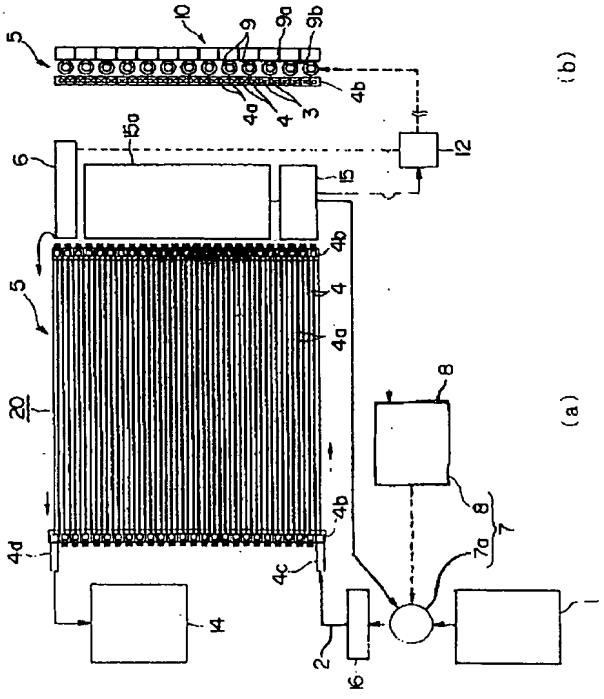
最終頁に続く

(54)【発明の名称】　汚水処理装置

(57)【要約】
【課題】　処理水質を高く維持することができ、かつ処理コストを低く抑えることができる汚水処理装置を提供する。
【解決手段】　有機物含有汚水を供給する汚水供給手段２と、汚水供給手段２から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒３を備えた汚水処理部５と、光触媒３に照射される自然光の強度を検出する光強度検出手段６と、光強度検出手段６によって検出された自然光の強度に基づいて汚水処理部５への汚水供給量を調節する汚水供給量調節手段７と、汚水処理部５の光触媒３に人工光を照射する人工光源９を有する人工光照射部１０と、光強度検出手段６によって検出された自然光の強度に基づいて人工光の強度を調節する人工光制御部１２を備えている。



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【特許請求の範囲】

【請求項１】　有機物含有汚水を供給する汚水供給手段と、
汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、
光触媒に照射される自然光の強度を検出する光強度検出手段と、
光強度検出手段によって検出された自然光の強度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有することを特徴とする汚水処理装置。

【請求項２】　請求項１記載の汚水処理装置において、汚水供給量調節手段は、汚水供給量を、前記自然光の強度にほぼ比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項３】　請求項１記載の汚水処理装置において、汚水供給量調節手段は、自然光の強度に応じて発電する光電池を動力源とし、汚水供給量を、該光電池の発電量にほぼ比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項４】　請求項１～３のうちいずれか１項記載の汚水処理装置において、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、
光強度検出手段によって検出された自然光の強度に基づいて人工光の強度を調節する人工光制御部を有することを特徴とする汚水処理装置。

【請求項５】　請求項４記載の汚水処理装置において、人工光制御部は、前記自然光強度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を前記自然光の強度にほぼ反比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項６】　有機物含有汚水を供給する汚水供給手段と、
汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、
汚水処理部に供給される汚水の有機物濃度を検出する有機物濃度検出手段と、
有機物濃度検出手段によって検出された有機物濃度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有することを特徴とする汚水処理装置。

【請求項７】　請求項６記載の汚水処理装置において、汚水供給量調節手段は、汚水供給量を、汚水中の有機物濃度にほぼ反比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項８】　請求項６または７記載の汚水処理装置において、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、
有機物濃度検出手段によって検出された有機物濃度に基づいて人工光の強度を調節する人工光制御部を有することを特徴とする汚水処理装置。

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【請求項９】　請求項８記載の汚水処理装置において、人工光制御部は、前記有機物濃度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を前記有機物濃度にほぼ比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項１０】　有機物含有汚水を供給する汚水供給手段と、
汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、
光触媒に照射される自然光の強度を検出する光強度検出手段と、
汚水処理部に供給される汚水の有機物濃度を検出する有機物濃度検出手段と、
光強度検出手段によって検出された自然光の強度および／または有機物濃度検出手段によって検出された汚水中の有機物濃度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有することを特徴とする汚水処理装置。

【請求項１１】　請求項１０記載の汚水処理装置において、汚水供給量調節手段は、汚水供給量を、自然光強度／有機物濃度にほぼ比例させることができるようにされていることを特徴とする汚水処理装置。

【請求項１２】　請求項１０または１１記載の汚水処理装置において、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、
光強度検出手段によって検出された自然光の強度および／または有機物濃度検出手段によって検出された汚水中の有機物濃度に基づいて人工光の強度を調節する人工光制御部を有することを特徴とする汚水処理装置。

【請求項１３】　請求項１３記載の汚水処理装置において、人工光制御部は、前記自然光強度または前記有機物濃度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を、自然光強度／有機物濃度にほぼ反比例させることができるようにされていることを特徴とする汚水処理装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、有機物を含有する汚水中の有機物を処理する装置に関する。

【０００２】

【従来の技術】従来、有機物含有汚水を処理する装置としては、光触媒を用いたものが知られている。この装置は、有機物含有汚水を二酸化チタンなどの光触媒に接触させるとともに、この光触媒に光を照射し、汚水中の有機物の光酸化分解を促すものである。光触媒を用いた汚水処理装置としては、自然光が光触媒に照射されるようにしたものや、紫外線ランプなどの人工光源を備え、この光源からの光によって有機物の酸化分解を行うことが

できるように構成されたものが用いられている。

【０００３】

【発明が解決しようとする課題】しかしながら、上記従来技術にあっては、次のような問題があった。上記光触媒に照射する光として自然光を用いる汚水処理装置では、自然光の強度が天候等に左右されることなどから、処理能力が一定とならず処理水質が不安定となる問題があった。また紫外線ランプ等の人工光源を用いる汚水処理装置では、処理能力は安定するものの、人工光源等に要する設備コストや電力コストが嵩む問題があった。本発明は、上記事情に鑑みてなされたもので、処理水質を良好に維持することができ、かつ処理コストを低く抑えることができる汚水処理装置を提供することを目的とする。

【０００４】

【課題を解決するための手段】本発明の汚水処理装置は、有機物含有汚水を供給する汚水供給手段と、汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、光触媒に照射される自然光の強度を検出する光強度検出手段と、光強度検出手段によって検出された自然光の強度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有することを特徴とするものである。前記汚水供給量調節手段は、汚水供給量を前記自然光の強度にほぼ比例させることができるように構成することができる。また、汚水供給量調節手段は、自然光の強度に応じて発電する光電池を動力源とし、汚水供給量を、該光電池の発電量にほぼ比例させることができるように構成することができる。また、前記汚水処理装置は、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、光強度検出手段によって検出された自然光の強度に基づいて人工光の強度を調節する人工光制御部を有するものとすることもできる。前記人工光制御部は、前記自然光強度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を前記自然光の強度にほぼ反比例させることができるように構成するのが好ましい。また、本発明の汚水処理装置は、有機物含有汚水を供給する汚水供給手段と、汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、汚水処理部に供給される汚水の有機物濃度を検出する有機物濃度検出手段と、有機物濃度検出手段によって検出された有機物濃度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有するものとすることもできる。前記汚水供給量調節手段は、汚水供給量を、汚水中の有機物濃度にほぼ反比例させることができるように構成することができる。また、前記汚水処理装置は、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、有機物濃度検出手段によって検出された有機物濃度に基づいて人工光の強度を調節する人工光制御部を有するものとすることもできる。前記人工光制御部は、前記有機物濃度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を前記有機物濃度にほぼ比例させることができるように構成するのが好ましい。また、本発明の汚水処理装置は、有機物含有汚水を供給する汚水供給手段と、汚水供給手段から供給された汚水中の有機物を、光の存在下で光酸化分解する光触媒を備えた汚水処理部と、光触媒に照射される自然光の強度を検出する光強度検出手段と、汚水処理部に供給される汚水の有機物濃度を検出する有機物濃度検出手段と、光強度検出手段によって検出された自然光の強度および／または有機物濃度検出手段によって検出された汚水中の有機物濃度に基づいて汚水処理部への汚水供給量を調節する汚水供給量調節手段を有するものとすることもできる。前記汚水供給量調節手段は、汚水供給量を、自然光強度／有機物濃度にほぼ比例させることができるように構成することができる。また、前記汚水処理装置は、汚水処理部の光触媒に人工光を照射する人工光源を有する人工光照射部と、光強度検出手段によって検出された自然光の強度および／または有機物濃度検出手段によって検出された汚水中の有機物濃度に基づいて人工光の強度を調節する人工光制御部を有するものとすることもできる。前記人工光制御部は、前記自然光強度または前記有機物濃度に基づいて人工光源の点灯および消灯を制御することができ、かつ人工光源の点灯時において人工光の強度を、自然光強度／有機物濃度にほぼ反比例させることができるように構成するのが好ましい。

【０００５】

【発明の実施の形態】図１は、本発明の汚水処理装置の第１の実施形態を示すもので、ここに示す汚水処理装置２０は、有機物含有汚水の供給源となる貯留槽１と、貯留槽１内の汚水を供給する汚水供給手段となる汚水供給管路２と、汚水供給管路２から供給された汚水中の有機物を光酸化分解させる光触媒３を充填した汚水流通管路４を有する汚水処理部５と、光触媒３に照射される自然光の強度を検出する光強度検出手段となる光強度センサ６と、汚水処理部５に供給する汚水供給量を調節する汚水供給量調節手段となる汚水供給量調節部７と、光触媒３に紫外線光を照射する人工光源である紫外線光源９を有する人工光照射部１０と、光強度センサ６によって検出された自然光の強度に基づいて紫外線光源９からの紫外線光の強度を調節する人工光制御部１２と、汚水処理部５を経た処理水が導入される処理水タンク１４と、汚水供給量調節部７、人工光制御部１２に接続された電源１５と、電源１５に接続された充電用光電池１５ａを備えたものとされている。

【０００６】汚水処理部５の汚水流通管路４は、複数の直管状の直線管路４ａが互いに平行に並べられ、これら直線管路４ａが、全体として入口部４ｃと出口部４ｄを

有する１つの流路を形成するようにそれぞれの端部同士が接続され、ホルダ４ｂによって互いに固定されて構成されている。直線管路４ａの材料としては、紫外線光等の人工光および自然光が透過可能な材料からなるものが用いられ、ガラス、合成樹脂等の透明材料が使用可能である。直線管路４ａとしては、例えば内径１５～２０ｍｍ、外径１７～２５ｍｍであるものを用いることができる。

【０００７】汚水流通管路４内に充填された光触媒３としては、光、例えば近紫外線の照射により活性化し、これに接触する有機物の光酸化分解反応を促進することができるものが用いられ、例えばTiO_2、ＣｄＳ、ＳｒＴｉO_3、Fe_2O_3等が使用可能である。この光触媒３は、例えば平均粒径２～１０ｍｍ程度の粒状に成形して用いるのが好ましい。

【０００８】光強度センサ６としては、汎用の紫外線センサ、照度センサ等を用いることができる。光強度センサ６は、これに照射される自然光の強度が、汚水流通管路４内の光触媒３に照射される自然光の強度にほぼ等しくなる位置、例えば汚水流通管路４の近傍に設置され、光触媒３に照射される自然光の強度（以下、単に自然光強度ということがある）を検出することができるようになっている。光強度センサ６は、自然光強度に応じた電圧値または電流値の検出信号を出力することができるようにするのが好ましく、検出信号の電圧値または電流値（検出信号値）を自然光強度にほぼ比例させる方式を採用したものとすることができる。

【０００９】汚水供給量調節部７は、貯留槽１内の汚水を汚水処理部５に送る送液ポンプ７ａと、送液ポンプ７ａによる汚水供給量を、光強度センサ６によって検出された自然光強度に基づいたものとする汚水制御部８を有するものとされている。汚水供給量調節部７は、送液ポンプ７ａによる汚水処理部５への汚水供給量を、光強度センサ６からの検出信号値に基づいて、自然光強度にほぼ比例させることができるように構成することができる。

【００１０】人工光照射部１０は、互いに平行に配置された複数の直管状の紫外線光源９と、これらを固定する矩形板状のホルダ９ａを有するもので、この人工光照射部１０は、汚水流通管路４の下方からその全体に紫外線光を照射できるようにされている。

【００１１】紫外線光源９としては、汎用のエキシマランプなどを用いることができる。ホルダ９ａの紫外線光源９側の面には、反射板９ｂが設けられ、紫外線光源９が点灯したときに紫外線光源９から反射板９ｂに向けて照射された光を高い効率で反射し、反射光を汚水流通管路４内の光触媒３に照射することができるようにされている。

【００１２】人工光制御部１２は、自然光強度に基づいて紫外線光源９の点灯および消灯を制御することができ、かつ紫外線光源９の点灯時において自然光強度に基づいて紫外線光の強度を調節することができるようになっている。人工光制御部１２は、光強度センサ６からの検出信号値が予め定められた設定値を下回ったとき、すなわち自然光強度が予め定められた設定値を下回ったときに紫外線光源９を点灯させ光触媒３に照射される光の強度を高めることができ、かつ検出信号値が上記設定値以上となったとき、すなわち自然光強度が予め定められた設定値以上となったときに紫外線光源９を消灯させることができるようになっている。また、人工光制御部１２は、紫外線光源９の点灯時において、光強度センサ６からの検出信号値に基づいて、紫外線光源９から光触媒３に照射される紫外線光の強度を自然光の強度にほぼ反比例させることができるようにするのが好ましい。

【００１３】電源１５は、送液ポンプ７ａに接続されており、送液ポンプ７ａの動力源となるようにされている。電源１５としては、充電用光電池１５ａの出力で充電する蓄電池を用いると、例えば晴天時の日中などの十分な自然光が得られる条件下だけでなく、曇天時や日没後などの自然光の強度が不十分な条件下においても、上記自然光強度が十分な条件下で光電池１５ａにより充電された電力を利用でき、電力コスト低減が可能となるため好ましい。充電用光電池１５ａとしては、光が照射されることにより発電するアモルファス光電池、多結晶光電池、結晶光電池等の汎用の半導体光電池等が使用可能である。

【００１４】なお、電源１５は、人工光制御部１２にも給電可能とされている。また、電源１５としては、汎用の直流または交流電源を用いることもできる。また、図中符号１６は、汚水供給管路２中の汚水をろ過するフィルタを示すものである。

【００１５】次に、本実施形態の汚水処理装置２０の使用方法の一例について説明する。本実施形態の汚水処理装置２０による処理の対象となる汚水としては、有機物を含有する産業排水、上水、下水、生活排水等を挙げることができる。本使用例においては、光強度センサ６によって検出された自然光の強度に基づいて、送液ポンプ７ａによる汚水処理部５への汚水供給量が、上記自然光強度にほぼ比例するように汚水供給量調節部７を予め設定しておく。また、人工光制御部１２は、紫外線光源９の点灯時において、紫外線光源９からの紫外線光の強度が自然光の強度にほぼ反比例するように設定しておく。

【００１６】以下、上記自然光の強度が予め定められた設定値以上である条件下、すなわち晴天時の日中などの十分な強度の自然光が得られる条件下において汚水を処理する方法を説明する。まず、貯留槽１内に貯留された被処理汚水を、光強度センサ６によって検出された自然光の強度に応じた所定の流量で、汚水供給管路２を通して汚水処理部５の汚水流通管路４内に入口部４ｃから供給する。汚水流通管路４内に供給された被処理汚水は、

汚水流通管路４中を流れる過程で汚水流通管路４内の光触媒３に接触する。

【００１７】この際、光触媒３は、光が透過可能な材料からなる汚水流通管路４を通して照射される自然光、例えば近紫外線により活性化され、その触媒作用により、光触媒３に接触する被処理汚水中の有機物を酸化分解する。光触媒３との接触により有機物が分解された被処理汚水は、有機物濃度が減少した処理水として汚水流通管路４の出口部４ｄから流出し、処理水タンク１４に流入する。

【００１８】光触媒３に照射される自然光の強度が低下した場合には、光触媒３の活性が低下し有機物酸化分解処理効率が低下するが、上述の通り、本使用例では、送液ポンプ７ａによる汚水供給量が、上記自然光強度にほぼ比例するようにされているため、自然光強度の低下量に応じて送液ポンプ７ａの送液量が低下し、単位時間当たりに汚水流通管路４内に供給される汚水量が少なくされる。例えば、汚水処理部５に照射される自然光の強度が約半分になった場合には、光触媒３による有機物の酸化分解処理効率も約半分に低下するが、汚水処理部５に供給される汚水の流量も約半分となり、単位時間当たり汚水処理部５に流入する有機物の総量が約半分となる。このように、汚水処理部５に供給される汚水中の有機物量が光の強度に応じたものとなるため、得られる処理水中の有機物濃度は低く保たれる。

【００１９】逆に、光触媒３に照射される自然光の強度が高まった場合には、汚水制御部８によって、自然光強度の増加量に応じて送液ポンプ７ａの送液量が増加する。この場合には、単位時間当たりに汚水処理部５に供給される汚水中の有機物の総量が増加するが、自然光強度の増大により有機物の酸化分解処理効率が向上するため、得られる処理水の有機物濃度は低く保たれる。例えば、汚水処理部５に照射される自然光の強度が約２倍になった場合には、汚水処理部５に供給される汚水の流量も約２倍となるが、光触媒３による有機物の酸化分解処理効率も約２倍となるため、処理水中の有機物濃度は低く保たれる。このように、自然光の強度が高まった場合には、処理水水質を悪化させることなく汚水処理量を高めることができる。

【００２０】次に、天候変化や日没等により自然光の強度が減少し、光強度センサ６によって検出された光の強度が予め定められた設定値を下回ったときの汚水処理装置２０の動作を説明する。自然光の強度が上記設定値を下回ったときには、光強度センサ６によって出力された検出信号に基づいて、人工光制御部１２が紫外線光源９を点灯させる。これにより、紫外線光源９から紫外線光が発せられ、発せられた紫外線光は汚水流通管路４内の光触媒３に照射され、光触媒３に照射される光の強度は上記設定値以上に保たれる。このため、光触媒３による汚水処理効率は高く維持され、処理水中の有機物濃度は低く保たれる。

【００２１】紫外線光源９が点灯する際には、人工光制御部１２によって、紫外線光源９から発せられる紫外線光の強度が、光強度センサ６によって検出された自然光の強度に反比例するようになる。これによって、紫外線光源９から照射される紫外線光の強度を必要最小限とし、紫外線光源９に要する電力コストを抑え、処理コスト低減を図ることが可能となる。

【００２２】本実施形態の汚水処理装置２０にあっては、光触媒３に照射される自然光の強度を検出する光強度センサ６と、光強度センサ６によって検出された自然光の強度に基づいて汚水供給量を調節する汚水供給量調節部７を備えたものとされているので、汚水処理部５に供給される汚水の量を、光触媒３による光酸化分解処理能力に応じたものとすることができる。従って、光触媒３に照射される自然光の強度が変動した場合でも、処理水中の有機物濃度を常時低く保つとともに、処理効率を高めることができる。

【００２３】また、送液ポンプ７ａによる汚水処理部５への汚水供給量を、上記自然光強度にほぼ比例させることができるようにすることによって、汚水処理部５に供給される汚水の量を、正確に光触媒３の光酸化分解処理能力に応じたものとし、処理水質を確実に良好に維持することができる。

【００２４】また、紫外線光源９を有する人工光照射部１０と、自然光強度に基づいて紫外線光の強度を調節する人工光制御部１２を備えたものとすることによって、自然光の強度が上記設定値未満に低下した場合にのみ、人工光照射部１０を用いて光触媒３に紫外線光照射を行い、光触媒３に与えられる光の強度を高く維持することができる。このため、従来の自然光のみを利用する汚水処理装置に比べ、光触媒３に与えられる光の強度が不足した場合でも直ちにこれを補い、光触媒３の活性を高く維持し処理水中の有機物濃度を確実に低く保つことができる。また、自然光強度が不足した場合にのみ人工光を用いるため、従来の人工光のみを用いる汚水処理装置に比べ、人工光照射に要するコストを低く抑制し、処理コスト低減を図ることができる。

【００２５】さらには、人工光制御部１２を、紫外線光源９が点灯した時の紫外線光の強度を自然光強度にほぼ反比例させることができるようにすることによって、光触媒３に与えられる光の強度を、正確に光触媒３の光酸化分解処理能力に応じたものとし、いっそうの処理コスト抑制が可能となる。

【００２６】次に、本発明の汚水処理装置の第２の実施形態について説明する。図２は、本発明の汚水処理装置の第２の実施形態を示すもので、ここに示す汚水処理装置３０は、電源１５および光電池１５ａに代えて、送液ポンプ７ａに接続された汚水供給量調節用光電池１９が設けられている点、および汚水制御部８が設けられてい

ない点で、上記第１の実施形態の汚水処理装置２０と異なる。

【００２７】汚水供給量調節用光電池１９としては、光が照射されることにより発電するアモルファス光電池、多結晶光電池、結晶光電池等の汎用の半導体光電池等が使用可能である。光電池１９としては、発電量が、光電池１９に照射される自然光強度にほぼ比例するものが用いられる。光電池１９は、これに照射される自然光の強度が、汚水流通管路４内の光触媒３に照射される自然光の強度にほぼ等しくなる位置、例えば汚水流通管路４の近傍に設置され、光触媒３に照射される光の強度に応じた発電量が得られるようになっている。光電池１９は、送液ポンプ７ａに接続され、送液ポンプ７ａによる汚水供給量を、光電池１９に照射される自然光強度にほぼ比例させることができるようになっている。

【００２８】上記汚水処理装置３０を用いて汚水処理を行う際、光電池１９に照射される自然光の強度が変動した場合には、この自然光強度に応じて光電池１９の発電量が増減し、これに基づいて、送液ポンプ７ａの送液量が増減する。例えば、光触媒３に照射される自然光の強度が約２倍となった場合には、光電池１９の発電量が約２倍となり、送液ポンプ７ａの送液量も約２倍に増加する。逆に、光触媒３に照射される自然光の強度が約半分となった場合には、送液ポンプ７ａの送液量も約半分となる。

【００２９】このように、本実施形態の汚水処理装置３０にあっては、上述の第１の実施形態の汚水処理装置２０と同様に、光触媒３に与えられる自然光の強度が変動した場合でも、この自然光の強度に応じて汚水供給量を調節し、処理水中の有機物濃度を低く保つとともに、処理効率を高めることができる。

【００３０】また、上記汚水処理装置３０にあっては、自然光によって発電する光電池１９を送液ポンプ７ａの動力源として使用することにより、上記効果に加えて、送液ポンプ７ａの駆動に要する電力コストを削減し、処理コスト低減を図ることができるという効果を得ることができる。また、汚水制御部８を不要とし、設備コスト削減が可能となるという効果も得られる。

【００３１】次に、本発明の汚水処理装置の第３の実施形態について説明する。図３は、本発明の汚水処理装置の第３の実施形態を示すもので、ここに示す汚水処理装置４０は、光強度センサ６が設けられておらず、貯留槽１内の汚水の有機物濃度を検出する有機物濃度センサ１３が設けられている点、人工光制御部１２に代えて、有機物濃度センサ１３によって検出された汚水中の有機物濃度に基づいて、紫外線光源９から照射される紫外線光の強度を調節する人工光制御部２２が設けられている点、および符号１７で示す汚水供給量調節部が、送液ポンプ７ａと、送液ポンプ７ａによる汚水供給量を、有機物濃度センサ１３によって検出された汚水中有機物濃度に基づいたものとする汚水制御部１８からなるものとされている点で、上記第１の実施形態の汚水処理装置２０と異なる。

【００３２】有機物濃度センサ１３としては、汎用のＣＯＤセンサ、ＴＣセンサ等を用いることができる。有機物濃度センサ１３は、貯留槽１に設置され、貯留槽１内の汚水の有機物濃度（以下、単に有機物濃度ということがある）を検出することができるようになっている。有機物濃度センサ１３は、有機物の濃度に応じた電圧値または電流値の検出信号を出力することができるようにするのが好ましく、検出信号の電圧値または電流値（検出信号値）を有機物濃度にほぼ比例させる方式を採用したものとすることができる。汚水供給量調節部１７は、有機物濃度センサ１３からの検出信号値に基づいて送液ポンプ７ａによる汚水処理部５への汚水供給量を、上記有機物濃度にほぼ反比例させることができるようにすることができる。

【００３３】人工光制御部２２は、上記有機物濃度に基づいて紫外線光源９の点灯および消灯を制御することができ、かつ紫外線光源９の点灯時に有機物濃度に基づいて紫外線光の強度を調節することができるようになっている。人工光制御部２２は、有機物濃度センサ１３からの検出信号値が予め定められた設定値以上となったとき、すなわち有機物濃度が予め定められた設定値以上となったときに紫外線光源９を点灯させ光触媒３に照射される光の強度を高めることができ、かつ検出信号値が予め定められた設定値を下回ったとき、すなわち有機物濃度が予め定められた設定値を下回ったときに紫外線光源９を消灯させることができるようになっている。人工光制御部２２は、紫外線光源９の点灯時において、検出信号値に基づいて紫外線光源９からの紫外線光の強度を汚水中の有機物濃度にほぼ比例させることができるようにするのが好ましい。

【００３４】次に、本実施形態の汚水処理装置４０の使用方法の一例について説明する。本使用例において、汚水供給量調節部１７は、有機物濃度センサ１３によって検出された汚水中の有機物濃度に基づいて、送液ポンプ７ａによる汚水処理部５への汚水供給量が、上記有機物濃度にほぼ反比例するように予め設定しておく。また、人工光制御部２２は、紫外線光源９の点灯時において、紫外線光源９からの紫外線光の強度が有機物濃度にほぼ比例するように設定しておく。

【００３５】本使用例では、汚水供給量が、汚水の有機物濃度にほぼ反比例するようにされているため、汚水中の有機物濃度が増加したときには、有機物濃度の増加量に応じて汚水処理部５に供給される時間当たりの汚水量が少なくされる。例えば、汚水の有機物濃度が約２倍となったときには、汚水処理部５に供給される汚水量が約半分となる。逆に、汚水中の有機物濃度が減少したときには、有機物濃度の減少量に応じて汚水処理部５に供給

される時間当たりの汚水量が増加する。例えば、汚水の有機物濃度が約半分となったときには、汚水処理部５に供給される汚水量が約２倍となる。従って、単位時間当たりに汚水処理部５に供給される有機物の総量はほぼ一定に維持され、得られる処理水中の有機物濃度は低く保たれる。

【００３６】有機物濃度が上記設定値以上に高まった場合には、人工光制御部２２によって紫外線光源９が点灯させられ、これによって光触媒３に照射される光の強度が高まる。一般に、有機物含有汚水処理においては、処理するべき汚水中の有機物濃度が高い場合、汚水中の有機物の酸化処理効率が低下する傾向があるが、本使用例では、有機物が上記設定値以上となると、紫外線光源９による紫外線光照射により光触媒３の光酸化分解活性が高まり、有機物の酸化分解処理が確実に行われるようになり、処理水質の低下を防ぐことができる。

【００３７】紫外線光源９が点灯する際には、紫外線光源９から発せられる紫外線光の強度は、有機物濃度センサ１３によって検出された有機物濃度にほぼ比例するようになる。これによって、紫外線光源９から照射される紫外線光の強度を必要最小限とし、紫外線光源９に要する電力コストを抑え、処理コスト低減を図ることが可能となる。

【００３８】本実施形態の汚水処理装置４０にあっては、汚水処理部５に供給される汚水中の有機物濃度を検出する有機物濃度センサ１３と、送液ポンプ７ａによる汚水供給量を汚水中の有機物濃度に基づいたものとする汚水供給量調節部１７を有するものとされているので、単位時間当たりに汚水処理部５に供給される汚水中有機物の総量を装置の処理能力に応じたものとすることができる。従って、汚水処理部５に供給される汚水中の有機物濃度が変動した場合でも、処理水中の有機物濃度を常時低く保つとともに、処理効率を高めることができる。

【００３９】また、汚水供給量調節部１７を、汚水供給量を有機物濃度にほぼ反比例させることができるようにすることによって、単位時間当たりに汚水処理部５に供給される有機物の総量を、正確に光触媒３の光酸化分解処理能力に応じたものとし、処理水質を確実に良好に維持することができる。

【００４０】また、人工光照射部１０と、汚水中の有機物濃度に基づいて紫外線光源９からの紫外線光の強度を調節する人工光制御部２２を設けることによって、汚水中の有機物濃度が高い場合でも、光触媒３の光酸化分解活性を高め処理水質の低下を防ぐとともに、光触媒３に照射される光の強度が過剰となるのを防ぎ処理コストを抑えることが可能となる。

【００４１】また、人工光制御部２２を、紫外線光源９の点灯時において紫外線光の強度を汚水中有機物濃度にほぼ比例させることができるようにすることによって、光触媒３に過不足なく光を照射することができ、いっそうの処理水質向上、処理コスト抑制が可能となる。

【００４２】次に、本発明の汚水処理装置の第４の実施形態について説明する。図４は、本発明の汚水処理装置の第４の実施形態を示すもので、ここに示す汚水処理装置５０は、第１の実施形態の汚水処理装置２０と同様の光強度センサ６が設けられている点、汚水供給量調節部１７に代えて、送液ポンプ７ａと、送液ポンプ７ａによる汚水供給量を自然光強度および／または有機物濃度に基づいたものとする汚水制御部２８からなる汚水供給量調節部２７が設けられている点、および人工光制御部２２に代えて、自然光強度および／または有機物濃度に基づいて人工光の強度を調節するものとされた人工光制御部３２が設けられている点で、上記第３の実施形態の汚水処理装置４０と異なる。

【００４３】汚水供給量調節部２７は、送液ポンプ７ａによる汚水供給量を、光強度センサ６によって検出された自然光の強度と、有機物濃度センサ１３によって検出された汚水の有機物濃度のうちいずれか一方、または両方に基づいたものとすることが可能とされている。汚水供給量を、自然光強度にのみ基づいたものとする場合には、汚水供給量調節部２７を、汚水供給量が自然光強度にほぼ比例するように設定できるようにするのが好ましい。また汚水供給量を、有機物濃度にのみ基づいたものとする場合には、汚水供給量調節部２７を、汚水供給量が有機物濃度にほぼ反比例するように設定できるようにするのが好ましい。また汚水供給量を、自然光強度と有機物濃度の両方に基づいたものとする場合には、汚水供給量調節部２７を、汚水供給量が自然光強度／有機物濃度（自然光強度を汚水中有機物濃度で除した値）にほぼ比例するように設定できるようにするのが好ましい。

【００４４】人工光制御部３２は、光強度センサ６によって検出された自然光強度、有機物濃度センサ１３によって検出された有機物濃度のうちいずれか一方、または両方に基づいて紫外線光源９の点灯および消灯を制御することができ、かつ紫外線光源９の点灯時において、自然光強度、有機物濃度のうちいずれか一方または両方に基づいて紫外線光の強度を調節することができるようになっている。

【００４５】人工光制御部３２は、自然光強度が予め定められた設定値を下回ったとき、有機物濃度が予め定められた設定値以上となったとき、または自然光強度／有機物濃度が予め定められた設定値を下回ったときに紫外線光源９を点灯させることができるようになっている。また、人工光制御部３２は、自然光強度が予め定められた設定値以上となったとき、有機物濃度が予め定められた設定値を下回ったとき、または自然光強度／有機物濃度が予め定められた設定値以上となったときに紫外線光源９を消灯させることができるようになっている。

【００４６】また、人工光制御部３２は、紫外線光源９の点灯時において、紫外線光源９からの紫外線光強度

を、自然光強度、有機物濃度のうちいずれか一方または両方に基づいて、例えば次に示すように設定することができるようになっている。紫外線光強度を、自然光強度にのみ基づいたものとする場合には、汚水供給量調節部２７を、紫外線光強度が自然光強度にほぼ反比例するように設定できるようにするのが好ましい。また紫外線光強度を、有機物濃度にのみ基づいたものとする場合には、汚水供給量調節部２７を、紫外線強度が有機物濃度にほぼ比例するように設定できるようにするのが好ましい。また紫外線光強度を、自然光強度と有機物濃度の両方に基づいたものとする場合には、汚水供給量調節部２７を、紫外線光強度が自然光強度／有機物濃度にほぼ反比例するように設定できるようにするのが好ましい。

【００４７】次に、本実施形態の汚水処理装置５０の使用方法の一例について説明する。本使用例において、汚水供給量調節部２７は、送液ポンプ７ａによる汚水処理部５への汚水供給量が、上記自然光強度／有機物濃度にほぼ比例するように予め設定しておく。また汚水供給量調節部２７は、紫外線光源９の点灯時において、紫外線光強度が自然光強度／有機物濃度にほぼ反比例するように予め設定しておく。

【００４８】以下、汚水中の有機物濃度および／または光強度センサ６によって検出された自然光の強度が紫外線光源９の点灯が不要となる範囲内で変動する場合の汚水処理装置５０の動作を説明する。

【００４９】まず、汚水中の有機物濃度が一定値をとり、かつ自然光強度が変動する場合について説明する。本使用例では、汚水供給量が、上記自然光強度／有機物濃度にほぼ比例するようにされているため、自然光強度の低下量にほぼ比例して汚水供給量が少なくされる。例えば、自然光の強度が約半分になった場合には、汚水供給量も約半分となり、単位時間当たり汚水処理部５に流入する有機物の総量が約半分となる。このように、単位時間当たりに汚水処理部５に供給される有機物の総量が光の強度に応じたものとなるため、得られる処理水中の有機物濃度は低く保たれる。

【００５０】逆に、光触媒３に照射される自然光の強度が高まった場合には、自然光強度の増加量に比例して汚水供給量が増加する。この場合には、有機物の酸化分解処理効率が向上するため、得られる処理水の有機物濃度は低く保たれる。例えば、自然光の強度が約２倍になった場合には、汚水供給量も約２倍となるが、光触媒３による有機物の酸化分解処理効率も約２倍となるため、処理水中の有機物濃度は低く保たれる。このように、自然光の強度が高まった場合には、処理水水質を悪化させることなく汚水処理量を高めることができる。

【００５１】次に、自然光強度が一定値をとり、かつ汚水中の有機物濃度が変動する場合について説明する。汚水中の有機物濃度が増加したときには、有機物濃度の増加量に反比例して汚水処理部５に供給される時間当たりの汚水量が少なくされる。例えば、汚水の有機物濃度が約２倍となったときには、汚水処理部５に供給される汚水量が約半分となる。逆に、汚水中の有機物濃度が減少したときには、有機物濃度の減少量に反比例して汚水処理部５に供給される時間当たりの汚水量が増加する。例えば、汚水の有機物濃度が約半分となったときには、汚水処理部５に供給される汚水量が約２倍となる。従って、単位時間当たりに汚水処理部５に供給される有機物量はほぼ一定に維持され、得られる処理水中の有機物濃度は低く保たれる。

【００５２】次に、自然光強度および汚水の有機物濃度が同時に変動した場合について説明する。本使用例では、汚水供給量が自然光強度／有機物濃度にほぼ比例するため、例えば、自然光強度が約２倍となると同時に汚水中有機物濃度が約半分となった場合、汚水供給量は、自然光強度に基づいて約２倍、有機物濃度に基づいてさらに約２倍、すなわち約４倍となる。また、自然光強度が約半分となると同時に汚水中有機物濃度が約２倍となった場合、汚水供給量は、自然光強度に基づいて約半分、有機物濃度に基づいてさらに約半分、すなわち約４分の１倍となる。また、自然光強度および有機物濃度がともに約２倍となった場合、汚水送液量は、自然光強度に基づいて約２倍、有機物濃度に基づいて約半分、すなわちほぼ変化なしとなる。

【００５３】また、天候変化や日没等により自然光の強度が減少したり、汚水中の有機物濃度が増加することによって、自然光強度／有機物濃度が予め定められた設定値を下回ったときには、人工光制御部３２によって紫外線光源９が点灯し、紫外線光源９から紫外線光が発せられ、光触媒３に照射される光の強度が増加する。

【００５４】紫外線光源９が点灯する際には、紫外線光源９から発せられる紫外線光の強度は、自然光強度／有機物濃度にほぼ比例するようになる。これによって、紫外線光源９から照射される紫外線光の強度を必要最小限とし、紫外線光源９に要する電力コストを抑え、処理コスト低減を図ることが可能となる。

【００５５】本実施形態の汚水処理装置５０にあっては、光強度センサ６と、有機物濃度センサ１３と、汚水供給量を自然光強度および／または有機物濃度に基づいたものとする汚水供給量調節部２７を有するものであるので、単位時間当たりに汚水処理部５に供給される汚水中有機物の総量を、正確に光触媒３の光酸化分解活性に応じたものとすることができる。従って、汚水処理部５に供給される汚水中の有機物濃度、光触媒３に照射される自然光強度のどちらが変動した場合でも、処理水中の有機物濃度を常時低く保つとともに、処理効率を高めることができる。

【００５６】また、汚水供給量調節部２７を、汚水供給量を自然光強度／有機物濃度にほぼ比例させることができるようにすることによって、汚水処理部５に供給され

る有機物の総量を、いっそう正確に光触媒３の光酸化分解処理能力に応じたものとし、処理水質向上、処理コスト抑制を図ることができる。

【００５７】また、人工光照射部１０と、自然光強度および／または有機物濃度に基づいて紫外線光源９からの紫外線光の強度を調節する人工光制御部３２を設けることによって、自然光強度および／または有機物濃度が変動した場合でも光触媒３の光酸化分解活性を高め処理水質の低下を防ぐとともに、光触媒３に照射される光の強度が過剰となるのを防ぎ処理コストを抑えることが可能となる。

【００５８】また、人工光制御部３２を、紫外線光源９の点灯時において紫外線光の強度を自然光強度／有機物濃度にほぼ比例させることができるようにすることによって、光触媒３に過不足なく光を照射することができ、いっそうの処理水質向上、処理コスト抑制が可能となる。

【００５９】また、図５は、本発明の汚水処理装置の第５の実施形態に用いられる汚水処理部および人工光照射部を示すもので、この第５の実施形態の汚水処理装置６０は、汚水流通管路４と紫外線光源９の間に、反射板２６が設けられている点で、上述の第１ないし第４の実施形態の汚水処理装置２０、３０、４０、５０と異なる。反射板２６は、自然光の光触媒３への照射効率を高めるためのもので、汚水流通管路４の全体にわたる矩形板状に形成されている。反射板２６は、上面側、すなわち汚水流通管路４側が高反射率となるよう形成され、汚水流通管路４の下方に到達した自然光を反射し、反射光を汚水流通管路４内の光触媒３に照射することができるようになっている。

【００６０】反射板２６は、面内方向に移動可能とされ、図５に示す汚水流通管路４と紫外線光源９の間の位置から、紫外線光源９から汚水流通管路４に向けた紫外線光の照射を遮らない位置まで移動できるようになっている。

【００６１】上記反射板２６を備えた汚水処理装置を使用する際、自然光のみを使用する場合には、反射板２６を図５に示すように汚水流通管路４と紫外線光源９の間に配置する。これにより、汚水流通管路４を通過し汚水流通管路４の下方に到達した自然光は、反射板２６上で反射し上方に向かい、その一部は汚水流通管路４内の光触媒３に照射される。このため、光触媒３に照射される自然光の強度が高められる。また、紫外線光源９を使用する場合には、反射板２６を、紫外線光源９から汚水流通管路４に向けた紫外線光の照射を遮らない位置まで移動させる。

【００６２】本実施形態の汚水処理装置６０では、反射板２６の使用により、自然光のみを使用する場合に、光触媒３に照射される自然光の強度を高め、汚水処理の効率を高めることができる。

【００６３】なお、上記各実施形態の汚水処理装置では、人工光照射部１０を、紫外線を照射する紫外線光源９を備えたものとしたが、これに限らず、可視光や赤外線光等を照射可能な光源を備えたものとすることもできる。また、上記各汚水処理装置では、人工光照射部１０を、汚水流通管路４の下方に設けたが、これに限らず、人工光照射部１０の設置位置は任意とすることができ、例えば、汚水処理部５の外部に設けることもできる。また、上記各汚水処理装置では、人工光照射部１０、人工光制御部１２、２２、３２を設け、自然光強度、有機物濃度、または自然光強度／有機物濃度が設定値を下回ったとき、または設定値以上となったときに、人工光を光触媒３に照射することができるようにしたが、本発明の汚水処理装置では、これに限らず、人工光照射部１０、人工光制御部１２、２２、３２を設けずに汚水処理装置を構成することも可能である。

【００６４】

【発明の効果】以上説明したように、本発明の汚水処理装置にあっては、光触媒に照射される自然光の強度および／または汚水中の有機物濃度が変動した場合でも、処理水中の有機物濃度を常時低く保つとともに、処理効率を高めることができる。また、光触媒に人工光を照射する人工光照射部と、人工光の強度を調節する人工光制御部を備えたものとすることによって、自然光強度低下時または有機物濃度増加時にのみ光触媒に人工光を照射し、これによって光触媒の活性を高く維持し処理水質の悪化を防ぐとともに、人工光照射に要するコストを低く抑制し処理コスト低減を図ることができる。

【図面の簡単な説明】

【図１】　（ａ）本発明の汚水処理装置の第１の実施形態の概略構成を示す平面図である。（ｂ）（ａ）に示す汚水処理装置の汚水処理部および人工光照射部の側面図である。

【図２】　（ａ）本発明の汚水処理装置の第２の実施形態の概略構成を示す平面図である。（ｂ）（ａ）に示す汚水処理装置の汚水処理部および人工光照射部の側面図である。

【図３】　（ａ）本発明の汚水処理装置の第３の実施形態の概略構成を示す平面図である。（ｂ）（ａ）に示す汚水処理装置の汚水処理部および人工光照射部の側面図である。

【図４】　（ａ）本発明の汚水処理装置の第４の実施形態の概略構成を示す平面図である。（ｂ）（ａ）に示す汚水処理装置の汚水処理部および人工光照射部の側面図である。

【図５】　（ａ）本発明の汚水処理装置の第５の実施形態に用いられる汚水処理部および人工光照射部を示す側面図である。（ｂ）（ａ）に示す汚水処理装置の要部拡大図である。

【符号の説明】

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２･･･汚水供給管路（汚水供給手段）、３･･･光触媒、５･･･汚水処理部、６･･･光強度センサ（光強度検出手段）、７、１７、２７･･･汚水供給量調節部（汚水供給量調節手段）、８、１８、２８･･･汚水制御部、９･･･紫＊外線光源（人工光源）、１０･･･人工光照射部、１２、２２、３２･･･人工光制御部、１３･･･有機物濃度センサ（有機物濃度検出手段）、１９･･･汚水供給量調節用光電池、２０、３０、４０、５０、６０･･･汚水処理装置

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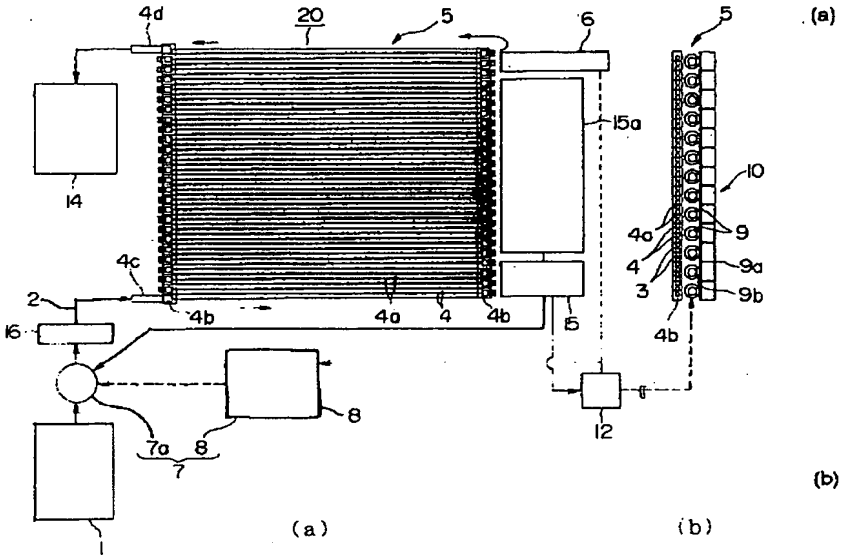
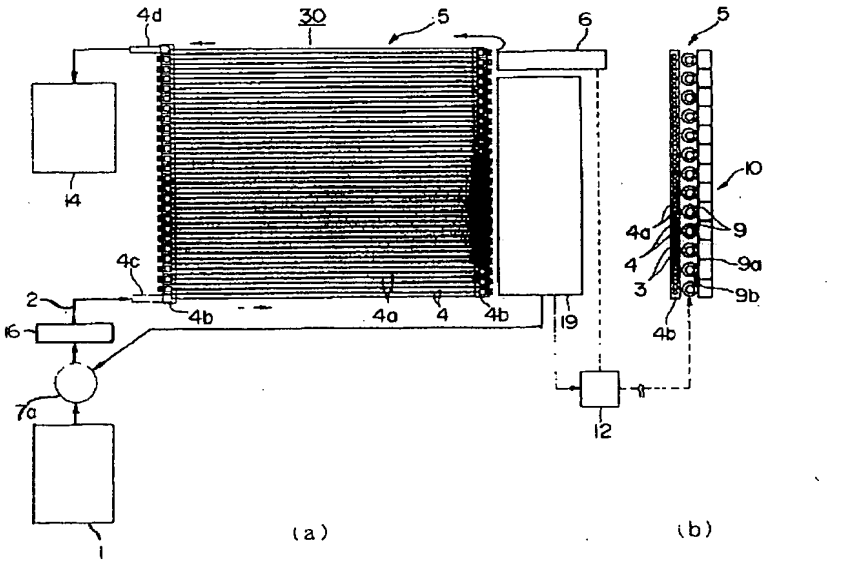
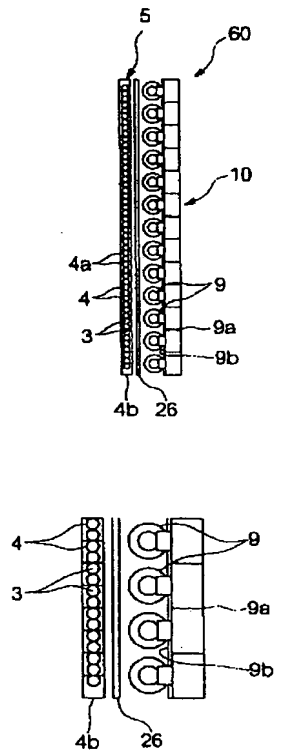
【図１】



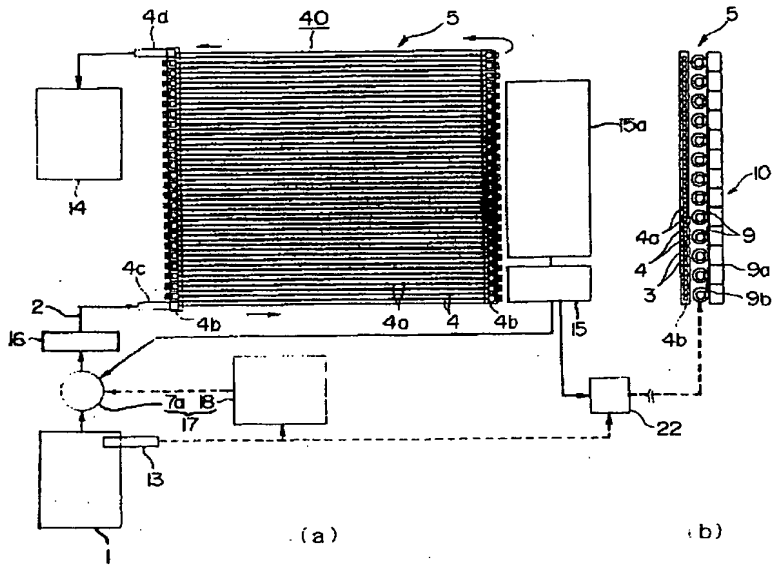
【図２】



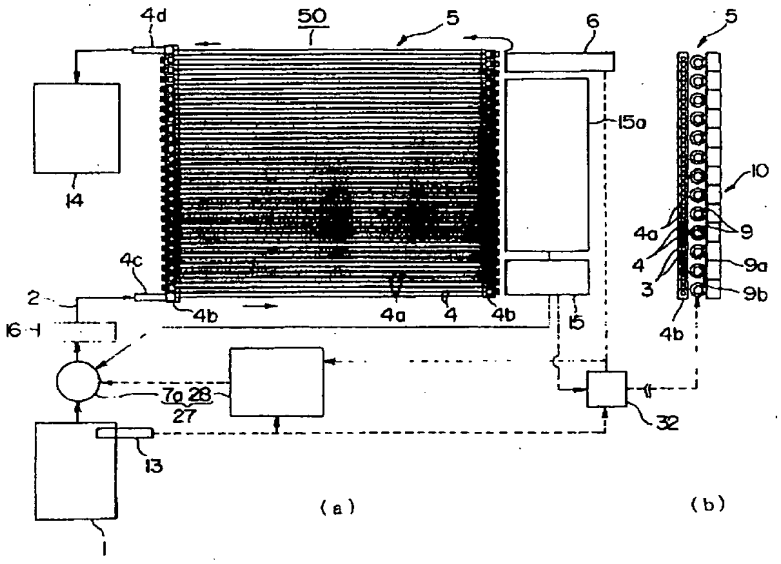
【図５】



【図３】



【図４】



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